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# International Journal of Orthodontia and Oral Surgery

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DR. LEROY MINER

PRESIDENT-ELECT OF THE AMERICAN DENTAL ASSOCIATION

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VOL. 22 MARCH, 1936 NO. 3

# Orthodontia

## THE MODERN TREND OF ORTHODONTIC EDUCATION

SPENCER R. ATKINSON, D.D.S., PASADENA, AND DAVID W. MCLEAN, D.D.S.,
LOS ANGELES, CALIF.

ORTHODONTICS, like general dental practice, is confronted today by two conflicting trends. One is toward a greater intricacy demanded by our growing knowledge of the health importance of all dental treatment.

That orthodontics is a health service can no longer be doubted. If it concerned itself only with tooth alignment, ideal arch form, facial dimensions and contours, orthodontics would be a cosmetic art and not a health service. But when it concerns itself, as it now does more and more, with the interrelation existing between dental malposition and endocrine and metabolic disturbances, with masticatory function, and with the prevention in later life of pyorrhea and caries, then orthodontics is truly a health service.

The recognition of these important responsibilities of orthodontic treatment makes the science more complicated. The accomplishment of these health objectives is under no circumstances a simple matter; but to attempt their accomplishment in a haphazard way, by procedures based upon snap judgment and inadequate and vague diagnostic study, is difficult indeed. To institute treatment with no clear conception of the etiologic factors of the case, to move teeth about with no preconception of the positions they must occupy for harmonious relations with the other factors of smooth and efficient function, would be a time consuming, difficult, and costly operation.

The other trend is the unconscious reaction of orthodontists to the national psychology of the moment—to the general economic trend toward the simplifying and the cheapening of all health service.

There are two kinds of simplicity. One is legitimate and is, in principle, the finding of the shortest distance between two points. It eliminates repe-

tition, superfluous steps—or, in other words, lost motion. The other kind of simplicity is achieved by ignoring health requirements, by compromise with ideals. In other words, it shortens the distance between two points by moving one of the points. It accepts lowered standards of service. This second sort of simplicity must be relentlessly fought by medicine, general dentistry, and orthodontics, if they value their future. For the public will recognize, in due course, that illegitimate simplicity is dangerous and costly.

The intricate requirements of modern orthodontic treatment can best be simplified by adequate preoperative study, so that errors and repetitious procedures may be eliminated. The study and preparation may thus be made more complicated in order that treatment may be greatly simplified and at the same time be more truly successful. Simplicity of procedure, when legitimate, is based upon thorough and painstaking study of the problem and preparation for its smooth and efficient solution.

No orthodontic diagnosis is complete without thorough study of the etiology of the case in hand, for the elimination of etiologic factors will play a large part in successful treatment.

The malposition may be a symptom of endocrine disturbance, as is instanced by the separated teeth found in the enlarging mandible of hyperpituitary patients in incipient acromegaly. While the pituitary gland is the agency of growth, the thyroid is the agency of development and calcification; a hypothyroid condition may be a factor in faulty calcification and hypomineralism, with three results which loom large to the orthodontist: (1) soft bone, in which teeth are readily misplaced by abnormal pressures and in which they are readily moved but are retained with difficulty; (2) soft teeth, abnormally liable to caries and especially so in the presence of orthodontic appliances; (3) the tendency toward root resorption.

The child patient is not likely to be a clear-cut classic endocrine case, and the glandular diagnosis should be referred to a competent specialist. In some cases gland therapy may be of value, but in other cases the recognition of an endocrine factor will be of value principally in pointing out the hazards and limitations of orthodontic treatment. It must be realized, too, that heredity in malocclusion is very likely to express itself in terms of endocrinology. In other words, the endocrine condition or unbalance may be inherited and the malocclusion be one of its manifestations.

One of the most important mechanical etiologic factors of malocclusion is faulty posture. Few orthodontists, despite the fact that all their activities are based upon the ability of bone to change its form under pressure, realize the readiness with which bone changes under the pressure of sleeping and leaning postures. The pressure exerted upon the bone of the jaws by orthodontic appliances rarely exceeds a few ounces, but postural habits exert pressure in terms of pounds.

When giving lectures in the lower grades of schools, one notices a number of children leaning on their hands, absorbed in the talk. When a joke is told causing the children to smile, the leaners are invariably found to be wearing orthodontic appliances. One cannot but be impressed by the conflict going on between the orthodontic appliances and the leaning habits.

Both the children and their parents and teachers, and often their orthodontists, are totally unaware of these habits and are likely to deny them. A valuable aid in the detection of leaning habits is a small fast-lensed camera, loaded with superspeed film, inconspicuously placed in the orthodontist's office. From this camera a long cable extends to a far corner of the work bench. On the wall is a convex mirror. The orthodontist turns his back upon the patient and proceeds with the making of bands to be applied to the teeth; meanwhile he is watching the child in the convex mirror. In five, ten or perhaps fifteen minutes the child wearying, drops into the habit posture. The doctor presses a button, releasing the camera shutter. When the child next visits the office he is shown a picture of himself in the leaning posture.

When parents and patient are thus made aware of the habit and convinced of its importance, cooperation is more likely to be secured toward its elimination. Often the child will drop into the posture two or three minutes after being corrected or warned, unconsciously demonstrating how constant and almost irresistible these habits become.

Another cause of malocclusion is faulty deglutition. Excessively large tonsils may interfere with proper closure of the posterior nares against the ingress of food during swallowing. When excessive or badly infiltrated tonsils are removed, especially if the surgery is crude, the palatine arch may be mutilated with a resulting excess of cicatricial tissue which also interferes with closure of the nares during swallowing. Removal, during tonsillectomy, of the sensory nerves to this region may produce the same result by removing the reflex stimulation to normal muscular action. In these conditions the patient makes extraordinary efforts to close the posterior nares. The jaws, which normally should be tightly closed, are held open; there is excessive pull on the angle of the mandible by the masseter and internal pterygoid muscles, and at the same time the suprahyoid muscles are pulling downward on the point of the chin. The result is a straightening out of the angle of the mandible, with a resulting appearance similar to acromegaly except that the mandible is not actually enlarged. The mutilated palatine arch can rarely be corrected and is one of the limitations to orthodontic accomplishment.

Another important point in orthodontic diagnosis, almost universally overlooked, is the orientation of the dentures in the skull. If the teeth are to remain in functional harmony and in a harmony of muscle balance, the mandibular teeth must be in correct relationship to the maxillary teeth, and the maxillary teeth must be in correct relationship to the skull.

The skull position of the maxillary denture may be most simply determined by the relationship of the first permanent molar on each side to the key ridge of bone descending from the base of the zygomatic process and dividing the anterior and posterior surfaces of the outer face of the maxillary bone. The mesiobuccal root of the second deciduous molar is under the key ridge at the age of three years; the denture moves progressively forward until at eighteen years of age the mesiobuccal root of the first permanent molar is under the key ridge.

These findings may be augmented by the gnathostatic method of Simon or the more recent method known as gnathodynamics.

In every child natural forces of growth are at work. This growth takes place by cell division, which is based upon life chemistry, and dependent first of all upon the presence of the chemical elements of which growth is made; it is the nutritional factor.

Assuming correct nutrition and adequate growth, this growth is directed by the growth and developmental hormones of the pituitary and thyroid glands, which in turn are influenced by heredity and environment and, of course, by the nutrition and general health of the glands themselves. For instance, heredity may direct growth to a given type of head, face, and jaws. Environment, or living conditions and routine, may influence the size and ruggedness of the individual, including of course his jaws.

The growing jaws and erupting teeth are guided also by a balance of the muscle pressures which surround them. Just as the bones of the dome of the skull grow from centers, guided between the scalp on one side and the brain covering on the other side, until their peripheries meet and articulate, so the jaws and erupting teeth are guided between the tongue and the muscles of the face until the maxillary and mandibular teeth assume the individual's normal arch form and plane of occlusion.

Abnormal pressures of leaning and sleeping habits or of deglutition and mouth-breathing derange nature's growth balance, and a malocclusion results.

Logical orthodontic diagnosis therefore must consider these facts. It must find the weak points in the nutritional and hormone set-up and if possible build those factors to their proper part in the growth program. It must recognize the abnormal pressure factors and remove or correct them.

Logical orthodontic treatment should not in any way inhibit these natural growth forces; rather it should aid them by supplying guidance where it is needed and a sufficient force to accelerate cell activity where it is sluggish or dormant.

When an individual tooth stands far out of the general relationship, it will require individual force to stimulate bone resorption and growth in the right direction; but even this force should be so mild in character as to stimulate nature's growth processes and so far as possible render nature unconscious of interference, for nature's consciousness of interference is what we know as trauma or pathology.

All this means that orthodontic treatment should not consist in banding and rigidly holding all the teeth of young patients in whom growth processes are still most active, and moving them arbitrarily to a preconceived, ideal arch form. Rather it should consist of guiding the teeth with as little interference as possible to the individual arch form toward which nature herself is trying to guide them. That individual arch form will be one to harmonize with the patient's facial type, tooth form, and the other factors of dynamic occlusion. At this early age of the patient, nature alone knows what that individual arch form should be.

In building any masticating equipment nature has a definite plan. The carnivorous animal has a hinge-joint temporomandibular articulation; his musculature pulls almost straight upward and his teeth have vertical knife blades. All these components fall into harmony to produce vertical shearing as a masticating function. The animal's digestive apparatus and chemistry are also coordinated with this type of chewing.

The herbivorous animal has rather flat mandibular fossae—a temporomandibular joint built for a lateral swing of the mandible. The musculature is arranged for a lateral pull upon the mandible, and the teeth have flat occlusal surfaces with lateral cutting blades. Place carnivorous teeth in an herbivorous jaw and musculature, and it would be impossible to move the teeth to positions permitting efficient chewing function.

The human being is an omnivorous animal, combining the two types of chewing armamentarium. In some individuals the carnivorous characteristics predominate; these persons have long narrow faces and narrower dental arches, and the teeth have long sharp cusps and the muscles a more vertical pull. Other individuals have wide faces with heavy zygomatic arches; the muscles have a more lateral pull, and the teeth have shorter and blunter cusps—the occlusal surfaces are flatter. In these individuals the herbivorous characteristics predominate.

The first gnathodynamic factor of occlusal function is the temporomandibular joint, which includes the downward and inward inclination of the paths travelled by the mandibular condyle heads.

In orthodontic cases the temporomandibular joint and the occlusal surfaces of the teeth come to the orthodontist ready made. They are nonpliable factors of dynamic occlusion; it is up to the orthodontist to harmonize the pliable factors to them. Nature's objective in building this harmony of factors is the same in all types of chewing equipment; it is to produce an efficient masticating machine for the preservation of the individual and the race. The orthodontist must have the same objective always in view, not only esthetics but function; after all, true esthetics is founded upon functional ability.

It is at this point in modern orthodontic study and practice that gnathostatics halts and gnathodynamics must carry on.

The condyle paths are the physiologic effects of the anatomy of the mandibular fossae and condyle heads, and of the motivating musculature and the limiting ligaments. They express the direction of movement of the condyle heads and therefore of the mandible and the mandibular denture, the movement being guided by the mandibular fossae, actuated by the musculature, and limited by the ligaments and opposing muscles.

The pitch and curvature of the longitudinal and lateral basic occlusal curves which constitute the occlusal plane are another factor; the length and angulation of posterior cusps and the overbite and overjet of anterior teeth are another factor; and the hinge axis of the mandible is still another factor. The ideal position for any tooth is that in which its cusps are brought into

harmony with the other factors of dynamic occlusion so that they will cooperate with rather than antagonize cusps in the opposite denture, throughout the range of functional chewing mandibular movements.

The temporomandibular joint comes to us ready formed. While morphologic and therefore physiologic changes do take place in it, they are evolutionary and not revolutionary changes; they require many years for their accomplishment.

Many individuals who have faulty occlusal contacts in their true static or centric denture relationship, unconsciously move the mandible to a position furnishing more efficient occlusal relationships and there do their chewing. This relationship we have called a bite of convenience. It has been customary for some men who do the so-called reconstruction operation of the patient's middle and more advanced age, to move the mandible forward to a position permitting a desirable interdigitation of cusps. When the bite is opened by building the teeth to a higher occlusal level, the opening takes place upon a hinge axis somewhere in the condyle head; the jaw swings backward as well as downward, and the dentures are brought into a Class II relationship. Moving the mandible forward corrects that condition and provides an interdigitation of cusps. In other words, the patient is given a convenience bite.

In such cases there is a gradual misplacement in the temporomandibular articulation. This is demonstrated by the study of skulls. The condyle heads function upon the sloping surface of the eminentia articularis or the base of the zygomatic arch. If those parts are flat, they will afford a workable base for the condyle head; in the long run, both the head and the base upon which it operates become flat. In these cases, so far as clinical experience and examination of dry specimens show, the periodontium of the dentures is ruined. It is reasonable to expect this result, since hundreds of times a day in nonmasticating closures of the dentures the opposing teeth will contact upon the inclined planes of cusps, with a resulting lateral thrust upon the teeth.

Many orthodontic patients present convenience bites of this type, and many an orthodontic diagnosis is incorrect because the mandibular condyle heads are not back in their proper places in the mandibular fossae when the diagnosis is made.

The cusp height and angulation come to the orthodontist ready made. They can be changed to some slight extent in an occasional tooth by selective spot grinding, but for the most part they are a nonpliable factor. Undoubtedly the day is coming when orthodontists, in moving teeth to positions in which their cusps will contact other cusps throughout the range of chewing movements, will do a limited amount of selective grinding of the occlusal surfaces. This grinding is an art in itself, and it should have an important place in the orthodontic curriculum.

The overbite and overjet are, for the orthodontist, variable factors; but he must be in a position to prescribe the changes indicated and the means of accomplishing them. A change of overbite, for instance, can be accomplished by depressing the anterior teeth or by elongating the posterior teeth.

The basic occlusal curves, the overbite and overjet, and the positions of the teeth in the jaws are the pliable factors of dynamic occlusion for the orthodontist. The dentist doing reconstruction operations has a different and more limited set of variables to deal with.

The occlusal curves undoubtedly vary during the period of growth and development; in childhood they are flat, in later life more curved and with greater pitch. When the mandible moves forward to the protrusive denture relationship, the anterior teeth move across the overjet and down the overbite, to an edge-to-edge relationship; at the same time the posterior teeth are sliding across the occlusal curve of Spee; its curvature and pitch provide an amount of opening which, with the cusp height of posterior teeth, corresponds to the overbite of the anterior teeth. The posterior teeth move down the cusp planes until, when the anterior teeth are edge to edge, the posterior teeth are cusp-point to cusp-point; there is even support of the dentures, and the stress burden is distributed equitably to all the teeth.

If such a coordination has not been brought about, the pressure in protrusive relationship will fall upon the anterior teeth only, with the result that the maxillary teeth will tend to relapse forward and the mandibular incisors will relapse by buckling of the line.

A similar picture presents when the dentures move to lateral chewing relationships, except that the canines then take the brunt of an uncoordinated occlusion, with the result that relapse is liable to occur through lingual drift of the mandibular canines and buckling of the mandibular anterior teeth.

To visualize what happens to treated orthodontic cases when there is such conflict during functional jaw movements, one has but to observe the results of the same conflict between artificial full dentures. A maxillary denture may fit the edentulous arch so tightly that it is difficult to remove. It will rock visibly when the moving mandible engages its conflicting cusps, but it will not let go. In six months it not only will let go—it will drop during conversation. The supporting ridge has undergone resorption as a result of excessive stress.

The immediate result of an orthodontic case in which there are dynamic occlusal antagonisms is relapse. The long range result is injury to the periodontium, and so-called pyorrhea in later life—and a limited masticating function throughout life.

All of this means greater complication for orthodontic teaching and practice, but it must come. A number of new procedures should now find their place in the orthodontic curriculum. They are the analysis of mandibular movements, the principles and functions of the hinge axis, and the method of its location upon the patient's skull; the principles of the orientation of models upon an articulator, and the principles of the reproduction of mandibular movements by articulators; a thorough exposition of the gnathodynamic factors whose harmony results in coordination of the occlusal surfaces of cooperating teeth; the art of setting up teeth on models in a manner correlating those factors; and the art of selective spot grinding of occlusal surfaces to enhance functional cooperation.

The day is undoubtedly coming when orthodontists will mount the models of intricate cases, and perhaps all cases, upon an adjustable articulator which will reproduce the patient's jaw movements; they will correct the mounted models, thus determining, prior to treatment, the approximate positions the teeth must occupy in order to function fully and smoothly. In the patient's youth the orthodontist is trying to produce the same functional conditions for which the dentist strives in rebuilding the mutilated natural dentures of later life, and which the prosthodontist tries to produce by means of artificial full dentures. It is only logical, then, that the orthodontist should have the same knowledge of gnathodynamics which they must have.

The orthodontist, in a sense, makes anatomy. In the strictest interpretation, he alters anatomy. It is incumbent upon him, above all other dentists, to realize that anatomy exists only as the vehicle for function. Anatomy is always the servant of physiology, else there is deformity and not anatomy. There is no such thing then as static anatomy. All anatomy is dynamic. And the anatomy which the orthodontist produces in the natural dentures of his patients must be a dynamic anatomy enabling the dentures to function fully and without destructive antagonism.

Any dental operation which does not maintain or enhance masticatory function falls short of its prime objective. Any operation which predisposes to later pathologic condition and to infection falls short of dentistry's second great objective. The two prime requisites of any branch of dentistry as a health service are (1) the promotion of function and (2) the eradication and prevention of pathologic conditions and infection.

Orthodontic failures may be esthetic or functional. There are cases which fall short of success because they place teeth in positions which defeat the function of protecting the soft supporting tissues—a function performed by the combination of tooth form and tooth position; they place teeth in positions predisposing to caries, which of course leads to pulpless teeth and focal infection; they place teeth in positions subjecting them to an excessive stress, which eventually destroys their periodontium; they place teeth in positions in which they cannot perform, to the full, their part in masticatory function.

Analysis of the causes of the actual post-treatment relapse of orthodontic cases will show that in most cases they are due to a lack of application of the principles of gnathodynamics.

Orthodontic education which takes full cognizance of these newer phases of the orthodontic problem will greatly reduce the number of relapses and incomplete successes in orthodontic treatment.

Another modern trend in orthodontic education is the tendency to break away from orthodontic systems. The one-appliance men are becoming a smaller and smaller minority. The one-appliance curriculum is fast going out of date. Every orthodontist should have a clear conception of the basic principles of tooth movement, not only in a physiologic or histologic sense,

but also in a mechanical sense. He should be familiar not only with the principles of the application of therapeutic force, but also with *all* the mechanical means for applying it.

The graduating orthodontist should understand the use of the various types of appliances now in use. The orthodontist of the future will band fewer teeth; he will use combinations of the various appliances to accomplish best the movements required by the given case. This means that the modern orthodontic curriculum should teach the basic principles and the manner of employment of all the appliances currently used in orthodontic practice.

All of this makes orthodontics more complicated. Formerly it was almost exclusively concerned with the mechanics of indifferent tooth movement. Eight or ten weeks in a technic class would provide the student with enough additional technic to enable him to make the simple appliances needed to accomplish the crude and usually unsatisfactory tooth movements of those earlier periods. The result was that the young dentist was unable to diagnose his cases properly, and he blindly undertook the treatment of intricate and even impossible malocclusions. Almost invariably he later gave up orthodontic practice because of his numerous failures. Meanwhile many young mouths were subjected to immediate ruin or to potential ruin which brings dental catastrophy in the patient's later life.

So intimately is modern orthodontic practice related to the complicated biotic factors of bone maintenance and of specialized anatomy, physiology, and pathology that the science has become far too complicated for any such scheme of orthodontic education.

The day of the private orthodontic school is past. Orthodontic education must be carried on in universities where competent instructors who are experts in the related specialties are available. The best orthodontic education and the greatest orthodontic advancement come when the knowledge contained in various scientific departments of a university can be pooled, correlated, and applied to the orthodontic problem.

# GROWTH OF THE JAWS AND THE ETIOLOGY OF MALOCCLUSION

ALEXANDER SVED,* B.S., D.D.S., NEW YORK, N. Y.

*(Continued from page 134, February)*

## CHAPTER VII

### THE FEEBLENESS OF GROWTH

From our previous studies we know that the growth of the face progresses at different rates in the three dimensions of space. These rates, however, were determined only for one period of life, so they apply only approximately to earlier and later periods. It must be remembered that the rate of growth of the total face height and all its component parts is accelerated from Stage II to Stage III, which does not occur in the dimensions of width and depth. It would be desirable to know the relative rates of growth at every stage of life, but from the data at our disposal this is not possible. The conclusions drawn from Hellman's studies enable us to arrive at other general conclusions which will greatly increase our knowledge of the etiology of malocclusion.

If we consider growth as a process of unfolding, we automatically assert that growth consists of a series of events occurring successively in a regular order. Since the complex individual develops from a single fertilized ovum, each such event implies a change from the one immediately preceding it. These changes are of different characters, so that in the course of time the original cell develops into a complex structure of different tissues, such as muscle, bone, nerve, etc. This structure is built up by a process of cell multiplication which consists of cell division, cell growth, and cell differentiation. Through the repeated recurrence of this cycle, the difference between the several groups of cells becomes greater, and thus the specialized tissues are formed. During this cycle, which represents a single act of cell multiplication, cell division precedes cell growth, which in turn always precedes differentiation. As time goes on, certain groups of cells become highly specialized, and they begin to perform special functions. Often these specialized cell groups cease to divide and grow, and they become busily engaged in the performance of special functions. The inner layer of cells of the enamel organ is a very good example of such highly specialized cells. In other instances, as in case of muscle cells, division and growth continue.

If we postulate the proposition that under ideal conditions the growth of an individual is brought to the most successful termination, we immediately imply that if the conditions to which the individual is subjected during growth are not ideal, the development of that individual will be interfered with. Any influence which may disturb these ideal conditions may be looked upon as an

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injurious agent. These injurious influences may become operative before or after birth, and they may be of only short duration, but often they persist throughout life. This suggests that all injurious agents do not affect the growth of the individual to the same degree. The duration of the disturbing influence must be an important factor in development, and its intensity must also be taken into consideration. Furthermore, since growth is a process of unfolding, it makes a great deal of difference whether the injurious agent becomes operative in the early or later stages of growth; for the appearance of a nocive influence at any stage of development cannot have any possible effect on growth which occurred prior to that stage. Thus, a disease of the same intensity and same duration may have a much greater retarding influence on the development of a younger individual than one more advanced in years. This follows directly from the established fact that the growth of an individual depends on cell multiplication. Since at any period of life the existing cells are the precursors of the cells of the future, the occurrence of a nocivity will affect the existing cells and all those which may later come from them.

The immediate effect of an injurious agent on the cells of a growing individual is qualitative in character. As a result of these qualitative changes in the cells, quantitative changes in growth may occur which become evident in an acceleration or retardation of the normal rates of growth. These changes manifest themselves as deviations from the normal form in later life, which collectively constitute the symptoms of the "feebleness of growth."

"Clinicians and pathologists of all ages have drawn a distinction between 'Disease' and 'Feebleness.' They have studied the feebleness of certain organs by the changes that have taken place in their functions. But the feebleness of one of the most important functions, namely that of growth, has been almost completely neglected. An opinion seems to prevail among pathologists that a growing subject may come under the influence of an injurious agent without his growth being affected." (Jansen.) If this opinion was proved to be true, then the study of the etiology of malocclusion would be no longer necessary; for, if growth cannot be altered by injurious influences, deformities cannot be caused by external agencies, and all malocclusions would be inherited. This is not in conformity with our experiences.

In a carefully planned study Jansen showed that the development of a growing individual is definitely affected by injurious agents. To bring out in detail the conclusions drawn, I shall quote freely from his work on the feebleness of growth.

"In order to properly explain the nature of the changes we have in view, let us imagine a child which is affected by a focus of microbic infection. The focus, if serious enough, will render the child 'ill' and will provoke *qualitative* changes, which may even be specific for the microbe in question. It is not to these facts, already much studied, that we wish to direct attention, but to the fact that the child, in addition to manifesting these changes, becomes feeble. All organs, even those not directly affected, and their functions show signs of feebleness, and so it is with the important function of growth. This also is affected by feebleness, and it is with this *feebleness of growth* that we intend to

deal. While diseases manifest themselves under an infinite number of forms, the feebleness of growth which they produce is essentially the same for every degree of it. The various degrees of feebleness of growth, indeed, differ mutually, but the symptoms of the same degree hardly differ. It little matters whether they have been provoked by enteritis, pneumonia, whooping cough, or some other infection after birth, or some injurious agent operating before birth, such as the great fatigue of the mother during pregnancy. Every nocivity acting on the growing body weakens its power of growth, provided the nocive agent be of sufficient intensity. Feebleness of growth, therefore, depends rather upon the intensity than upon the quality of the nocivity.

"It is evident that the changes in the human body must be either qualitative or quantitative. Now, those which are occasioned by disease may be *qualitative*, as for example, the changes in the serum in infections, while feebleness of growth is to be ranged among the *quantitative* changes of the processes of life." The quantitative changes are the symptoms of the feebleness of growth. They are determined by the qualitative changes occasioned by disease, and the functional conditions to which the parts of the growing individual are subjected.

"In seeking the symptoms of the feebleness of growth it is advantageous to compare the children of the same parents, preferably in the case of large families, with regard to the injurious influences to which they have been subjected. It is obvious that in carrying out this comparison we meet also with hereditary phenomena which are purely qualitative in nature. These, however, are distributed among the different children in an absolutely arbitrary manner. Instead of showing an exact parallelism with the injurious influences by which the children have been affected, these purely hereditary phenomena never yet have shown such parallelism. Thus it will be easy to allow for them in the following observations. Obstetricians have observed that the second child of a mother, as well as those that follow, may develop better than the first. In general, however, the children of the same parents may be expected to show a great resemblance in their development. But, if injurious influences have been active on some of the children, either before or after birth, characteristic phenomena present themselves, which vary with the intensity of the nocive agent rather than with its nature. It is this series we are about to describe as illustrative of the feebleness of growth. They will be found to be governed by the following three fundamental principles."

> "I. Feebleness of growth is proportional to the intensity of the nocivity.
>
> II. Feebleness of growth is proportional to the rapidity of the growth of the individual and its parts. (Law of the vulnerability of fast growing cell groups.)
>
> III. Feebleness of growth is characterized by enhanced sensibility and enhanced fatigability."

To illustrate the operation of these principles we cannot do better than give Jansen's own description of family H (Fig. 20), in which the various degrees of the feebleness of growth are represented. "In this family there

are no infectious or nutritive nocivities to be traced, only that, as in all poor families, the fatigue of the mother has increased in successive pregnancies. Of her own accord she has informed us that during her fifth and sixth pregnancies she often used to fall down on the floor from fatigue.

"The body height of the first child is 9.6 per cent above the normal, and even surpasses that of his parents. That of Nos. 2, 3, and 4 is about equal to normal, whilst that of Nos. 5 and 6 is 11.4 per cent and 14.8 per cent respectively below the normal. This retardation of growth becomes obvious when we compare No. 6 with a normal child of the same age." (Figs. 21 and 22.)

"The body weight of Nos. 5 and 6 is 5.4 per cent and 19.4 per cent respectively below the normal, whilst the other children are above the normal body weight. The two youngest children learned to walk at the age of five and a half and seven and a half years, whilst the others walked when they were two, the development of the locomotor apparatus of the two youngest children taking place much later than that of the others.

"Every clinician, seeing the two youngest children, would, in conformity with the science of our days, label this condition as Rachitis. But we shall try to show in the following pages that Rachitis is just a severe degree of feebleness of growth, conditioned like the other degrees, by the principles we have just formulated. To that effect we consider more closely the different changes of normal growth with which we are dealing.

"The eldest child exceeds normal height as we have observed. We might be tempted to assume that this was the outcome of a surplus of the power of growth. But this is not the case; the boy's *muscles are too weak.* He had *flat feet,* a *protuberant abdomen,* a *round back,* blue and moist hands (acrocyanosis and acrohyperhydrosis). These four muscular symptoms prove that his musculature is too feebly developed to bear the body-weight, to resist abdominal pressure, to balance the respiratory forces, or to properly resist haemostatic pressure. Briefly, the eldest child *has outgrown his strength.*

"Nos. 2, 3, and 4 equally show the four muscular symptoms. No. 4 has, in addition, developed knock-knees, showing that in her the growth of the skeleton is altered in those parts which find themselves in the most rapid growth, viz., the growth cartilages near the knee. This girl has weak feet like her brothers. There is no doubt but that in the upright attitude the cartilages near the knee are made to bear greater pressure in the lateral than in the medial parts. To this greater pressure they have responded with lessened growth. In the normal condition the reverse takes place, for the part bearing more weight shows a more rapid growth. From this fact the normal course of development is for the curved legs of little children to grow straight and to remain straight. In other words, *growth cartilages normally have a reserve power of growth.* This reserve power of growth has disappeared in No. 4.

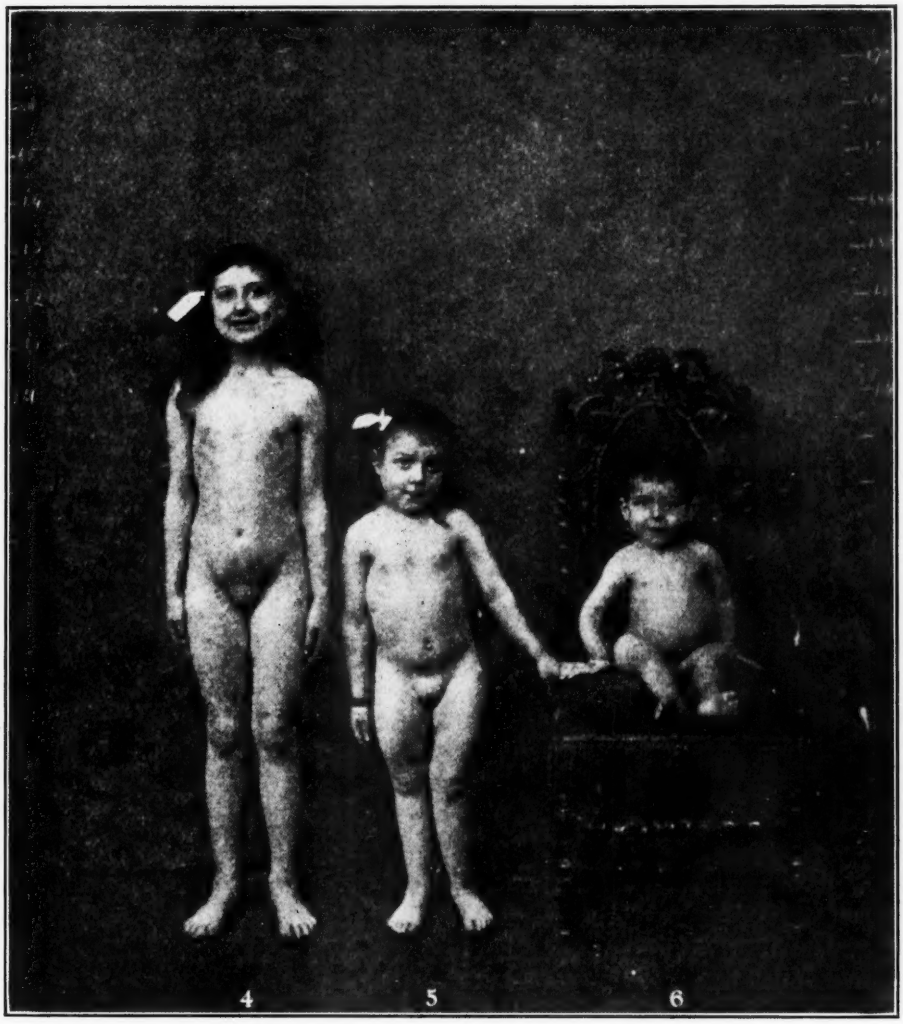
"Later on we shall consider this phenomenon more closely. For the present it may suffice to emphasize the fact that in No. 4 there is a *retardation of growth* as a result of an *increase of pressure,* viz., in the fastest growing skeletal parts. And the same phenomenon will be observed in the more severe cases of feebleness of growth even in part growing less rapidly.

| | No. 1. | No. 2. | No. 3. |
|---|---|---|---|
| Age | 17 years 1 month | 15 years 4 months | 12 years 10 months |
| Height | 1.705 m. | 1.495 m. | 1.365 m. |
| Weight | 56.7 kg. | 46 kg. | 37.2 kg. |

| | | | |
|---|---|---|---|
| Height = the normal of Quetelet | +9.6% | +1.28% | +0.5% |
| Weight = the normal of Quetelet | +14.8% | +16% | +30% |
| Began to walk at the age of | 2 years | 2 years | 2 years |

Fig. 20*A*.

| No. 4. | No. 5. | No. 6. |
|---|---|---|
| 10 years 1 month | 7 years 6 months | 5 years 1 month |
| 1.26 m. | 0.935 m. | 0.775 m. |
| 26.7 kg. | 15.6 kg. | 10.4 kg. |




| | | |
|---|---|---|
| +5.8% | −11.4% | −14.8% |
| +25.5% | −5.4% | −19.4% |
| 2 years | 5½ years | not yet (5 years) |

Fig. 20*B*.

"Nos. 2, 3, and 4 are examples of the common type of knock-kneed children which has been the subject of many disputes as to whether they are or are not to be reckoned among the 'rachitic.' These children constitute an intermediate stage between the type with muscular weakness which has outgrown its strength, represented by No. 1, and the type whose body-height lags behind normal, and which is represented by Nos. 5 and 6. In other words: *Between the slightest degree of feebleness of growth, which chiefly affects the muscles, and the*

Fig. 21.—Child five years, eight months old.

*severe degree which moreover affects all skeletal parts.* The characteristic thickenings which are visible in all growth-cartilages of Nos. 5 and 6 are palpable in the ribs and the lower ends of the fibula in children of this type.

"We have seen that in the knock-kneed child the retardation of growth from increase of pressure shows itself only in the neighborhood of the growth cartilages near the knee. In Nos. 5 and 6 this retardation of growth, owing to increase of pressure, is manifest near all growth cartilages. The smallness of

No. 6 of the family H shows, as we have seen, that in all growth cartilages growth is retarded. But the deformity which presents itself near each of these cartilages shows that growth has been retarded in different degrees in the different parts of these cartilages. Wherever different parts of these cartilages have been subjected to varying degrees of pressure, growth has been retarded in proportion

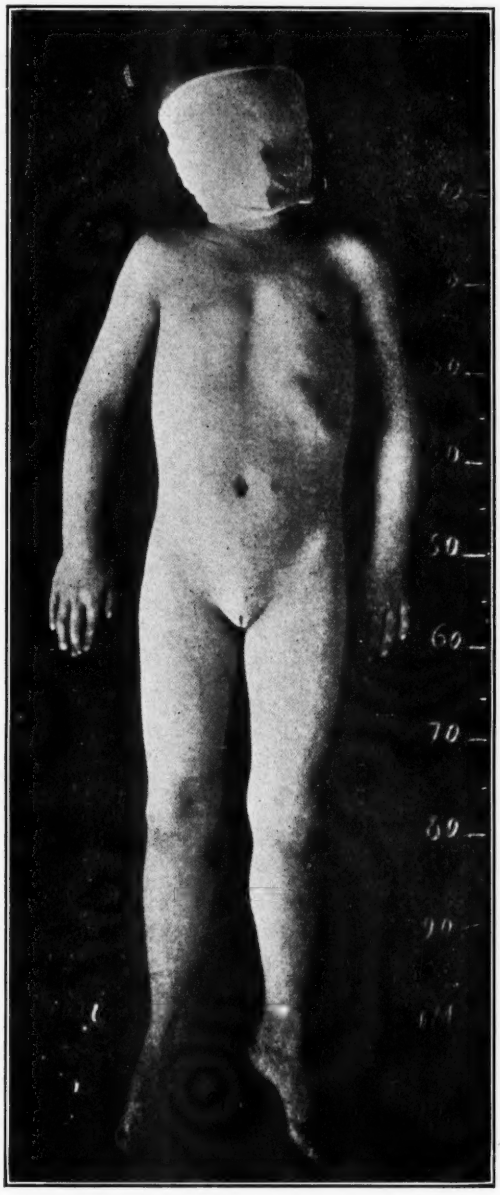


Fig. 22.—Child five years, six months old.

to the pressure to which the parts have been exposed. This holds good for the growth cartilages of the vertebrae, as well as for those of long bones.

"In a striking way [in Fig. 23] *this retardation of growth in response to increase of pressure* shows itself on a comparison of the skiagrams of the hand of No. 6 of the family H with those of the (very nearly) normal child of Fig. 22.

The normal hand is reproduced of three-quarter normal size [Fig. 24]; the rachitic hand is reproduced of a size such as to make the median ray, measured from the base of the third metacarpal bone to the end of the terminal phalanx, equal to the normal hand. [Fig. 23.] Its size is about 0.92 of the normal. What strikes us on comparing these two figures is that in the rachitic hand the metacarpals are too short. The finger relatively too long. And among the metacarpals the first and fifth are still more retarded than the other. So the bones of the hand of No. 6 of the family H show a retardation of growth which is proportional to

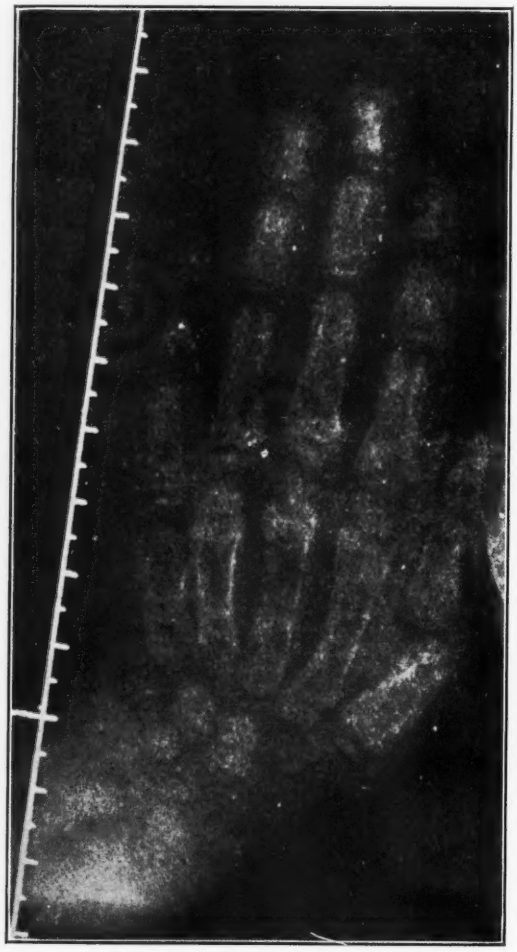


Fig. 23.—Hand of child shown in Fig. 21.

the pressure they have to resist. The metacarpals, which are subjected to greater pressure than the fingers, show more retardation of growth; and the first and fifth of these bones, which, moreover, have to bear the pressure of the thenar and hypothenar muscles, appear also to experience the inhibitory effect of their action. It should be observed that the shortening of these metacarpals is not due to bending. The bones of this hand show a diminution of the normal power of bones to grow against pressure. In No. 4 of the family H this diminution of growth is limited to a pressure which surpasses the normal, while in Nos. 5 and 6 it shows itself even when the pressure is below normal."

From this description of family H, it appears that Jansen recognizes three degrees of the feebleness of growth in the order of severity, namely, slight, moderate, and severe.

"The *slight degree* of feebleness is characterized by the weakness of the muscles and enhanced body height, the type which has outgrown its strength. The *moderate degree* is characterized by average height, muscular weakness and knock-knees. The *severe degree* of feebleness is represented by the rachitic type, which shows a retardation of the growth of the entire skeleton with

Fig. 24.—Hand of child shown in Fig. 22.

marked muscular weakness. In all these cases the musculature is affected first, and then the skeleton and all organs in the body in the order of their rapidity of growth."

If the growth of the body can be affected by injurious agents of infections, toxic, nutritive or environmental in origin, then the first principle of the feebleness of growth requires no further proof. The first principle states that the feebleness of growth is proportional to the intensity of the nocivity. The intensity of an injurious agent is measured by the degree and duration of its action.

The second principle of the feebleness of growth is the "*law of the vulnerability of the fast growing cell groups.*" Here it is implied that under the influence of a nocive agent the faster growing parts of the body are first affected. Muscle tissue which increases from 25 per cent of the body weight in the newborn to 43.4 per cent in the adult is the most rapidly growing tissue in the body, and it is always affected before the skeleton is involved. Bone tissue increases from 13.7 per cent of the body weight in the newborn to 17.48 per cent in the adult. It is the second most rapidly, growing tissue, and, if the injury is sufficiently great, the skeleton becomes affected after the musculature. This law together with other correlated facts may explain the development of malocclusion, and Brash furnishes adequate proof of its correctness, as will be shown later. The third principle of the feebleness of growth deals with the

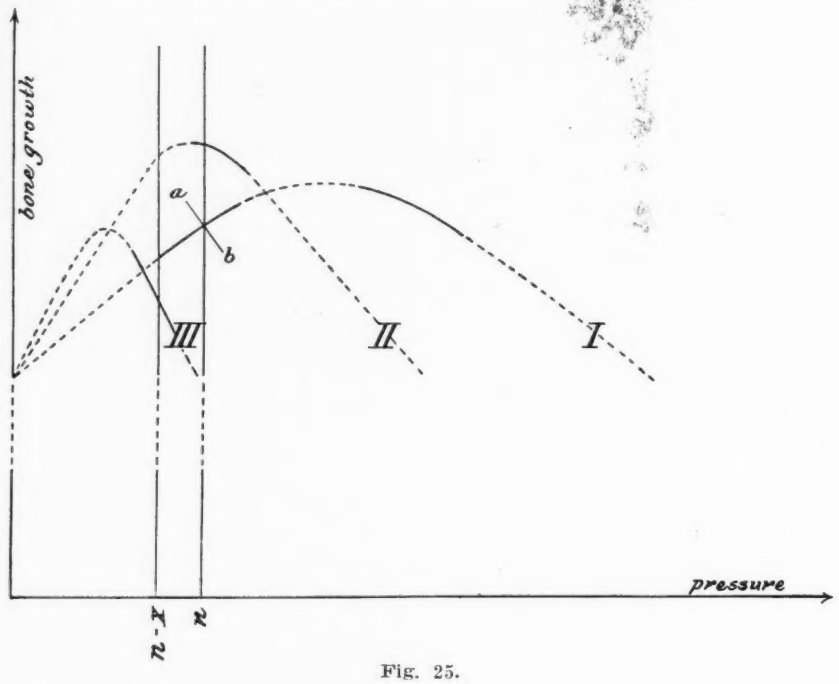



Fig. 25.

characteristic reaction of bone to functional pressure in individuals affected by the various degrees of feebleness. It states that the feebleness of growth is characterized by "enhanced sensibility and enhanced fatigability." In order to explain the different reactions, Jansen gives a graphic representation of the phenomena of growth (Fig. 25) of the normal skeleton as well as that which is affected by feebleness of growth. By noting the functional pressure on the horizontal and growth on the vertical axis, the following curves are obtained:

I for the normal skeleton.
II for the skeleton showing slight feebleness of growth (which shows excess of height).
III for the skeleton showing severe feebleness of growth.

The continuous parts of these curves are based on clinical observations, the dotted parts form the inevitable complement. The point "n" represents normal pressure.

These curves indicate that as the pressure on the normal skeleton is increased above normal, the part reacts with an increase in growth, and this is termed the *reserve power of growth.* When a certain point beyond the normal pressure is reached, growth proceeds at a much slower rate. The curve representing the skeleton affected by slight feebleness of growth shows that at a pressure less than normal (point n – x), the bone reacts with an increased growth, which may exceed the normal rate; but on a slight increase of functional pressure beyond that point there is a rapid decline of bone growth which falls below the normal. The curve representing the severe feebleness of growth shows a more rapid growth under very slight functional influences, but any increase in pressure results in a rapid decline in the rate of growth, which falls below the curve of the skeleton affected by slight feebleness.

The more ready response of feeble bone to slight functional pressures is indicated by the greater slope of the ascending arm of the curves. The more severe the degree of feebleness, the greater the slope of the curve. This is referred to as the *enhanced sensibility* of the skeletal cells. The greater rate of decline of the descending arm of the curves, even under slight functional pressures in severe cases, represents the *enhanced fatigability* of the skeletal cells.

It is important to note that the first effect of a slight injury is to bring about an increased rate of growth, which is gradually diminished as the effects of the nocive influences increase. It will be shown that Hellman's work partially proves the third principle.

In addition to the musculature and skeleton, the nervous system, adenoid tissue, sex glands, and endocrines are also affected by feebleness of growth in the order given.

REFERENCE

Feebleness of Growth and Congenital Dwarfism, by Murk Jansen, Oxford Medical Publications, 1921.

*(To be continued)*

# A CASE OF ROOT RESORPTION

EARL F. LUSSIER, D.D.S., SAN FRANCISCO, CALIF.

HISTORY.—The patient, a girl fourteen years of age, had had previous orthodontic treatment for a period of two and one-half years. She had frequent colds. She had had measles and mumps. Tonsils and adenoids had been removed. She was a mouth-breather. A bone tumor (osteochondroma) was removed from the arm. X-ray treatments were given. Radiographic examination of the mouth disclosed root resorption. The parents were advised of this, and it was explained that further treatment might result in greater root resorption. Further treatment was begun with this understanding.

*Attributed Etiology.*—At the time of examination the gum tissue was in an extremely hypertrophied condition and bled profusely on touching. The maxillary incisors were in protraction. The mandibular incisors were in retraction and distraction. The mouth-breathing probably induced by adenoids might have been the contributing cause; although the history of the bone disease and root resorption, probably due to the presence of glandular dysfunction, might lead us to believe that the early development of the child might also have been affected by a glandular disturbance and hence might have been an important factor in causation.

*Diagnosis.*—Photostatic facial reproductions, gnathostatic plaster denture reproductions (Fig. 1), and radiographic examinations (Fig. 2) were made. Graphs of the gnathostatic plaster denture reproductions were made (Fig. 3). An appraisal of the material showed that the anomaly in relation to the:

A. *Raphe median plane* (relation of the lateral halves of the denture to the medium plane) to involve in the maxillary arch an anterior dental contraction mild and asymmetrical and posterior dental distraction mild and asymmetrical. And to involve in the mandibular arch an anterior dental contraction mild and asymmetrical and posterior dental distraction mild and asymmetrical. The figures comparing the width between the molars and the premolars to pons normal are:

Distance between $\underline{4}|$ and $|\underline{4}$ −3.5 mm.
Distance between $\underline{6}|$ and $|\underline{6}$ +1.5 mm.
Distance between $\overline{6}|$ and $|\overline{6}$ +3.0 mm.
Distance between $\overline{4}|$ and $|\overline{4}$ −1.5 mm.

B. *Orbital plane.* Both the photostatic profile facial reproduction and the denture reproduction showed a marked change from the normal. They reveal

Presented to the American Board of Orthodontia, and released by the Board to be given at the Thirty-Third Annual Meeting of the American Society of Orthodontists, New York, N. Y., April 30, May 1, 2, and 3, 1935.

in the maxillary arch an incisal coronal protraction mild and asymmetrical and in the mandibular arch an incisal dental alveolar retraction medium (one-half tooth) asymmetrical. Plus a mandibular angle 142 degrees abnormally and extremely large, which tends to produce a profile characteristic of a total mandibular retraction, pogonion and gnathion both being posterior to normal and cardinal symptoms of a total mandibular retraction.

C. *Eye-ear plane.* To involve in the maxillary arch a total dental abstraction medium and asymmetrical and in the mandibular arch a total dental mild and asymmetrical.

Fig. 1.

*Treatment Therapy Employed.*—To effect a further stimulus to a normal development of the mandible it is advisable to retain the mandibular third molars as long as possible. It is advisable to make radiographic examinations of them yearly.

To avoid, as much as possible, further root resorption, it was deemed advisable to use an 0.040 inch labial arch in the maxillary arch with slight pressure to reduce the incisal coronal protraction as well as to accomplish the necessary widening of the arch in the premolar and molar area by means of lingual extensions from the anchor bands.

*Maxillary Appliance.*—(Fig. 4.) Anchor bands, 0.007 inch in thickness and 0.018 inch in width, were fitted to the maxillary first permanent molars. Half round tubes were soldered to the lingual surfaces of the molar bands. At this

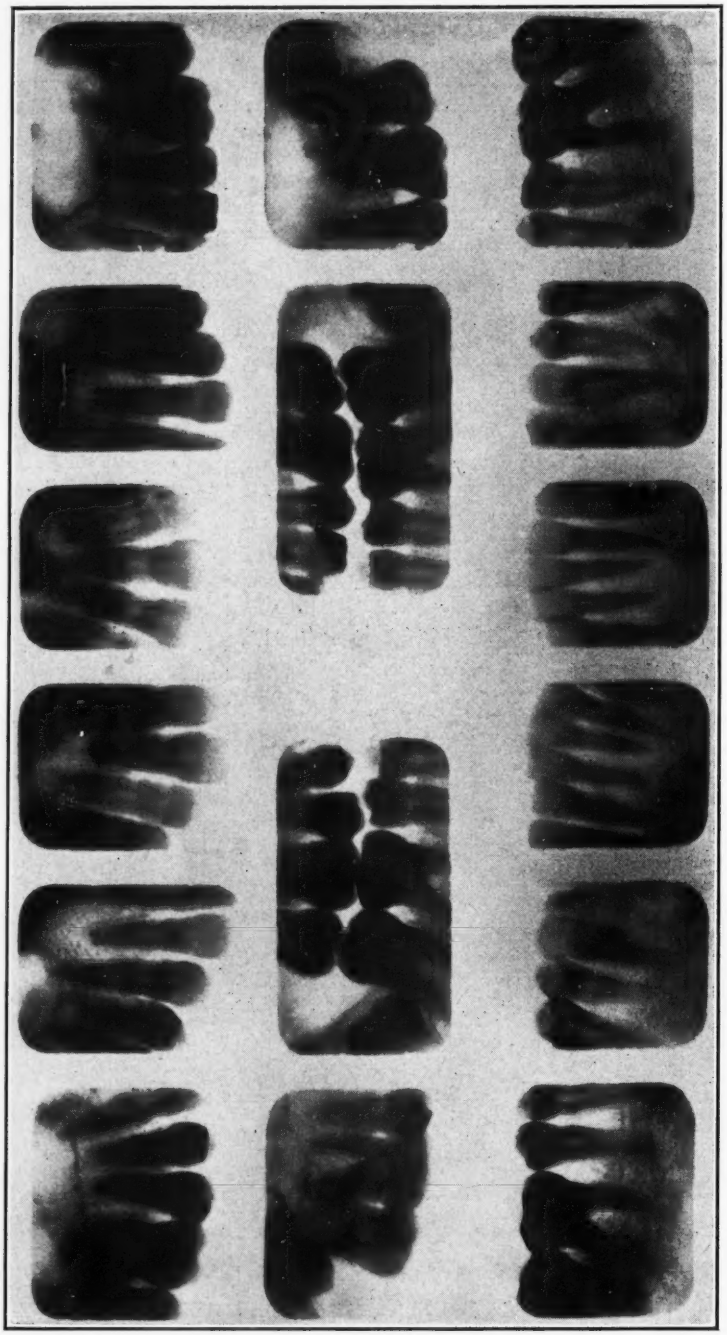


Fig. 2.

point an impression was taken with the bands in position, and an artificial stone model was poured. A lingual wire 0.040 inch in diameter was then closely adapted to the lingual surfaces of the teeth on the cast; and, after half round posts were soldered, it was adjusted in position by the heat treatment method;

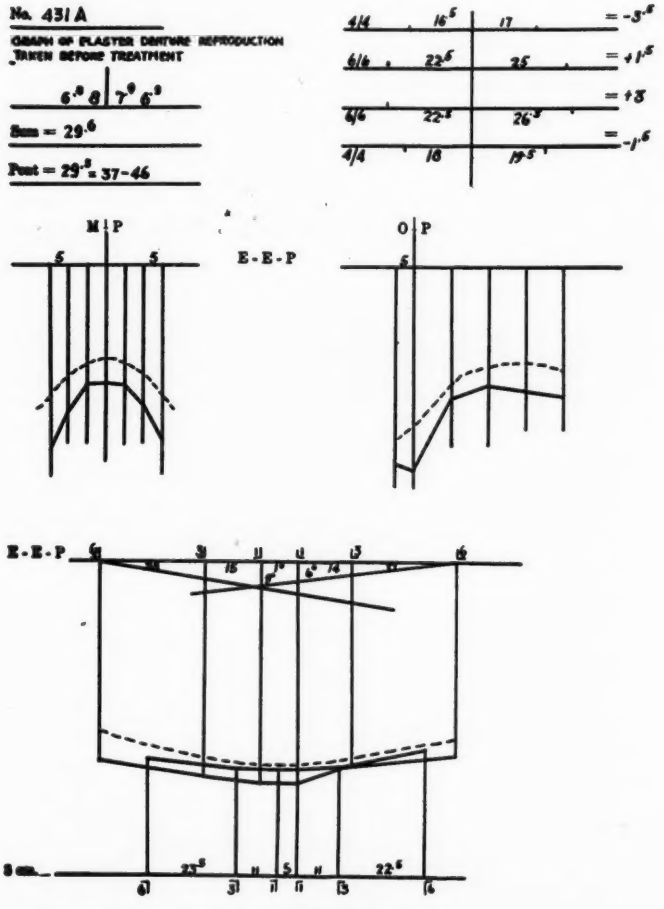

No. 431 A
GRAPH OF PLASTER DENTURE REPRODUCTION TAKEN BEFORE TREATMENT
6.8 6 7.9 6.9
8mm = 29.6
Post = 29.8 = 37-46
4/4 16.5 17 = -3.5
6/6 22.5 25 = +1.5
= +3
4/6 22.5 26.5 =
4/4 18 19.5 = -1.5
M P
5 5
E-E-P
O P
5
E-E-P
8 mm.
23.5
22.5

Fig. 3.

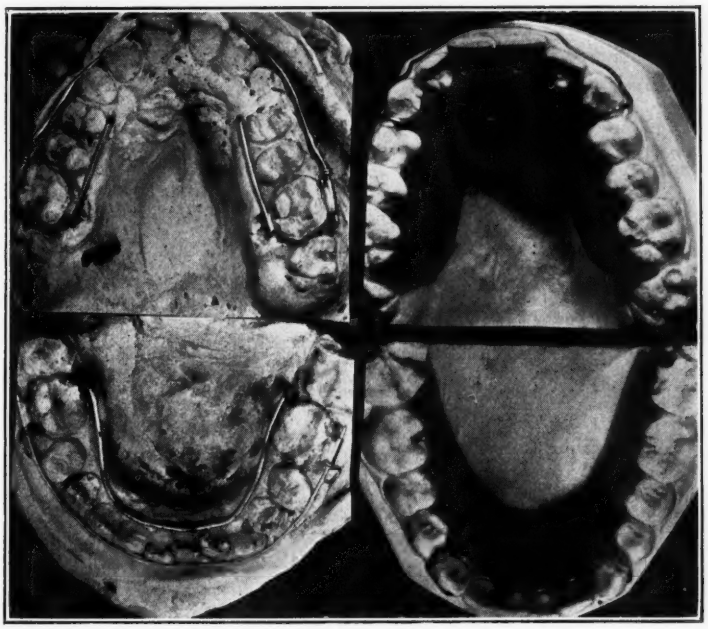


Fig. 4.

0.022 inch lock springs were soldered to the body wire; 0.040 round tubes were soldered on the buccal of the molar bands; 0.040 wire extensions were soldered to the lingual of the molar bands extending to the mesial surface of the canines. An 0.040 round wire was then adapted to the labial and buccal surfaces of the teeth on the cast. Stop springs of 0.025 inch wire in diameter were soldered to the labial body wire in front of the buccal tubes. The maxillary bands were cemented to place and the arches adjusted at intervals to accomplish the desired results.

Fig. 5.

*Mandibular Appliance.*—Anchor bands, 0.007 inch in thickness and 0.018 inch in width, were fitted to the mandibular first permanent molars. Half round tubes were soldered to the lingual surfaces of the anchor bands. At this point an impression was taken with the molar bands in position, and an artificial stone model was poured.

A lingual wire, 0.040 inch in diameter, was then closely adapted to the lingual surfaces of the teeth of the cast; and, after half round posts were soldered, it was adjusted in position by the heat treatment method; 0.022 inch wire lock springs were soldered to the body wire (the lingual arch to act as a stabi-

lizer for the molars); 0.040 round tubes were soldered on the buccal surface of the molar bands. A labial alignment wire was used to move the second premolars lingually and to move slowly the anterior teeth labially by ligating.

Later the six anterior teeth were banded with bracket bands, and an 0.018 × 0.023 flat ribbon arch was used to finish the alignment of the anterior teeth. The mandibular bands were cemented to place and the arches adjusted at intervals to accomplish the desired results. After the teeth were in occlusion a resection of the gum labially and lingually around all the teeth was performed by an oral surgeon, and, after healing, a rigorous home care of the gums was instituted.

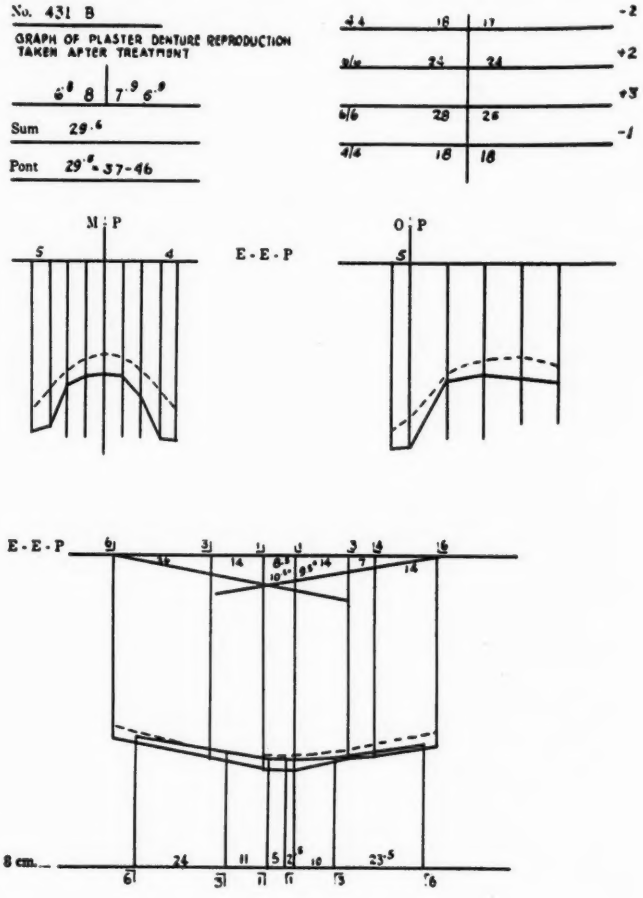



Fig. 6.

*Results Achieved.*—The examination was made in April, 1932. The treatment appliances were placed in May, 1932, and the postoperative treatment appliances were placed in June, 1933. Hawley plate retainers were made for both maxillary and mandibular arches. The patient was observed regularly for a period of two years.

*Prognosis.*—Prognosis in this case is for an unfavorable result.

*Observation and Conclusion.*—October, 1933, plaster denture reproductions, photographic reproductions (Figs. 5 and 6) and radiographic reproductions (Fig. 7) were made. The plaster denture reproductions showed that a very much better functional position of the teeth was obtained.

The profile photograph showed a change in the lower lip curve and a lessening of the strained condition of the upper lip. The front view photograph showed that a pleasing expression had been obtained by rearranging the anterior teeth. The examination revealed a healthy and firm gum tissue and no bleeding but some hypertrophy. The radiographs revealed a further resorption of the root ends as had been anticipated (Fig. 7). My conclusions are that the health of

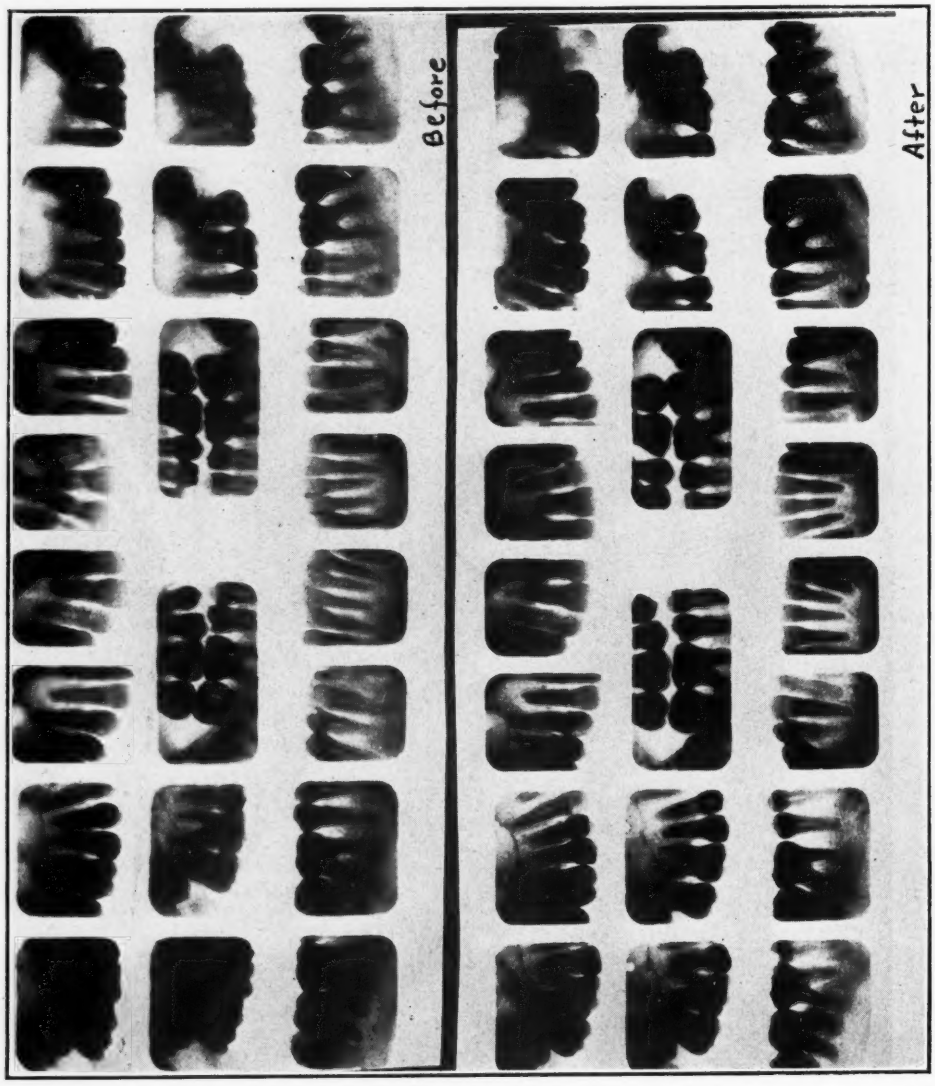



Fig. 7.

the gum tissue and the general health benefited by a better functional position of the teeth and the mental help due to the production of a more pleasing facial expression demanded the further attempt at orthodontia treatment; that the presence of an extreme hypothyroid disturbance made the case a very great risk as far as root resorption and bone disturbance and final stability of the teeth was concerned.

The prognosis is not favorable unless the patient is treated by a physician for the thyroid disease and unless great cooperation is given by the patient to

both the physician and the dentist. This prognosis was made in October, 1933. Since then the patient has had some treatment for glandular dysfunction but has not continued this treatment. However, February 10, 1935, I obtained facial reproductions (Fig. 8) and radiographs and a complete physical examination. An opportunity to make further observation is possible and further reports of the case will be made. The reports of physician and oral surgeon for this case follow:

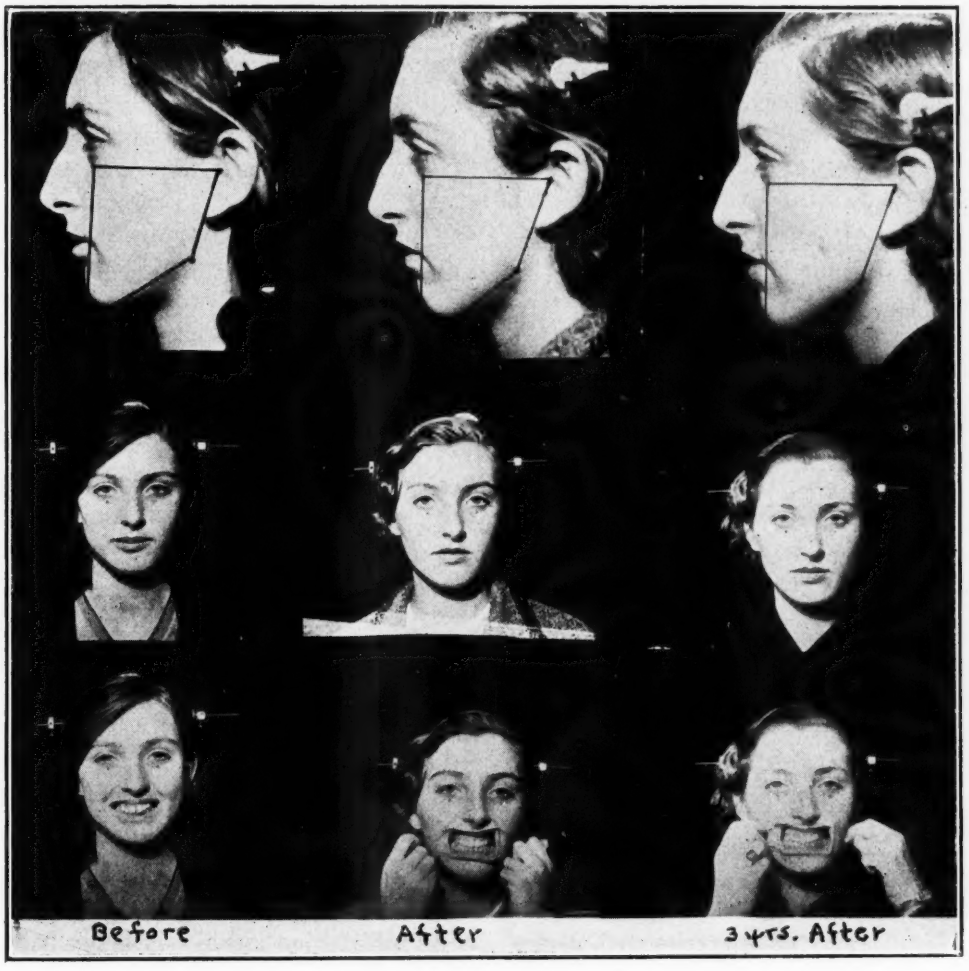



Fig. 8.

PHYSICIAN'S REPORT

The patient is fifteen years old. Her complaints are (1) orthodontic malformation and (2) old tumor growth on arm.

She states that she has had an overbite since early childhood, and has been under the care of Dr. Lussier during the last year and one-half with good results. About one year ago she had a tumor growth on the bone in the right forearm, which was removed by Dr. B. Pathologic examination revealed it to be an osteochondroma. She claims good health otherwise.

She was born in San Francisco. She is now in high school. She has had no accidents and no serious diseases. She had had a tonsillectomy and an operation for a tumor on the right forearm. Menstruation began at the age of twelve years; regular, no pain, of five days' duration.

Family history: parents living, no chronic diseases in family.

Examination reveals her to be well developed, well nourished; heart sounds of good quality, no murmurs; tonsils out; teeth reveal few fillings; moderate overbite; negative physical findings otherwise.

Blood count: Hemoglobin 79 per cent (Sahli); white count 8,200; red count 4,220,000.

Differential: Polymorphonuclear leucocytes 60 per cent; small lymphocytes 32; large lymphocytes 8.

Urinalysis: Clear amber; specific gravity 1.016; definite bile ring; acid reaction to litmus; sugar—questionable reaction; albumin—negative. Microscopic: negative.

The basal metabolic rate is minus 15.5 per cent. Dr. B. states that the basal metabolic rate one year ago was minus 17 per cent; so it has remained rather constant during the past year. I think that there is no doubt but that she has a lowered thyroid function.

The bone tumor osteochondroma is a benign growth, usually in the long bones and most often is multiple. In other words, if her whole skeleton were x-rayed, it would not be surprising to find other bone tumors. Some investigators have also pointed out that they are frequently seen in certain cases of dysfunction of endocrine glands that have to do with regulation of calcium metabolism. Parathyroid and thyroid dysfunction are most commonly associated with this condition. In view of such reports in the literature it is particularly interesting to find a low thyroid function in this case. Chondromas are also notably frequent in persons who have rickets in early life. This further tends to associate it with a disturbance in calcium phosphorus metabolism.

### ORAL SURGEON'S REPORT

Case of gingivectomy for hypertrophied gum tissue. The patient, a girl, fourteen years of age, was referred by her orthodontist. Patient presented with extreme hypertrophy of the gingival gum tissue about all the teeth of both jaws. She had had previous orthodontic treatment.

The maxilla was operated at one sitting, infiltration anesthesia being used.

By using special knives, in this case an incision was made on the right buccal surface starting 10 mm. above the gingival border between the first and the second molars passing downward and forward so that the hypertrophied gum was excised in a manner similar to festooning a rubber plate. This incision was carried forward to the central region, then a similar incision was made on the left buccal connecting up with right incision in central region. This same procedure was carried out on the lingual surface. When all hypertrophied gum tissue was removed from the maxilla, a dressing was applied and left in place for five or six days. After that time the dressing was removed and the gums were swabbed with viogen and allowed to heal. A few days later the mandible was operated in exactly the same manner. Outside of soreness very little discomfort was experienced by the patient.

# THE CONSTRUCTION AND APPLICATION OF THE CEPHALODONTOMETER

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THE recent advance in the science and art of orthodontia, wherein studies in the growth and development of the jaws and faciocranial structures have constituted so important a part, has given evidence of the great need for scientifically accurate mensuration of relative growth rates and computations in distances of the various anatomic parts involved.

Scientific considerations concerning the most feasible and promising of the avenues of approach to study this problem seem acceptable to the choice of the pioneer in the field, namely, B. Holly Broadbent, and the method to be that of the scientifically accurate production and the duplication of radiographs for comparison of changing measurements and proportions.

In consultation with an engineer, we have completed the construction of an instrument to initiate such studies.

In considering the nature of the orthodontic problem, it is apparent that it is necessary, in order to formulate a plan for practical and reliable diagnosis, to consider the revelations of research pertaining to growth and development of the jaws and face, particularly as concerns a starting point from which to measure or determine the relative positions of the jaws to each other; second, as concerns their position respectively to underlying structures, remotely to the cranium.

It is with regard to this second consideration that the need for the application of such an instrument, as herein described, is manifested. The studies involved are the relative position of the facial structures as they show emergence to a greater or lesser degree from beneath the brain case; the status of growth of the brain case and of underlying facial structures; the study of the comparative growth rates in degree as well as speed during respective periods with the center or anterior border of the foramen magnum construed to be the center of growth activity and the area contiguous to the basocranial axis as that which manifests lesser change in applying mensuration to respective outlying anatomic points which in turn show greater change and instability.

This study is promising from the approach by scientifically accurate radiographs, with others of extreme accuracy in duplication for comparison of changing measurements and proportions. The processes of growth, as revealed through research by several investigators, indicate that growth takes place concomitantly with added increment from behind, as well as increase in height and width.

"The face therefore grows backward, but in consequence of this, the face migrates forward," as stressed by Milo Hellman; also, in concurrence with Hunter, Humphrey, Keith, Compton, Brash, Todd and others who made similar studies through different avenues of approach.

Clinically, then, it is important to apply the stimulus so that the developing structure adds the increment posteriorly, *without drawing* the teeth forward within their investing tissues by a direct stimulus in advance of the general facial development. The dentition should present, in the finished case, in a satisfactory position relative to the apical bases of the jaws.

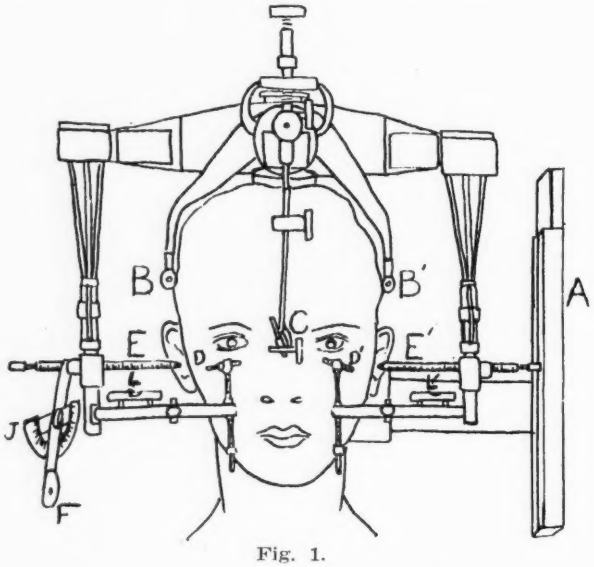


Fig. 1.

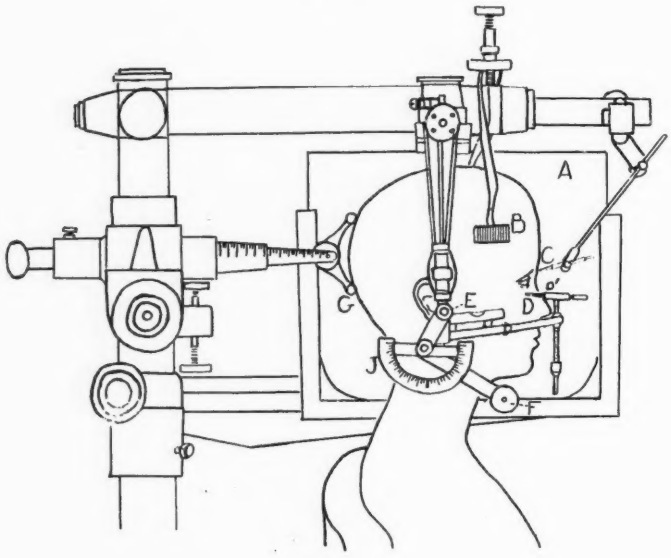


Fig. 2.

If subsequent to treatment the dentition is positioned more anteriorly than that which constitutes a proper basal relationship, then a bimaxillary protrusion is produced and a decided disharmony in the facial proportions results.

Consequently, such studies pertaining to the changing positions of the teeth and in turn the relative changes of the underlying structures should be of inestimable value to offer enlightenment concerning the true effect and the changes involved during the treatment of malocclusions.

The mechanical construction of the cephalodontometer consists of a framework within which the head of the patient is placed in position for exact duplication at any subsequent time to produce the film of duplicate exposures to the central rays of the x-ray machine.

First, the head is known to be in duplicate position at the subsequent sittings by the readings of various calibrated level gauges, the readings of which record the position of the head relative to three planes, in complete registration, as it is

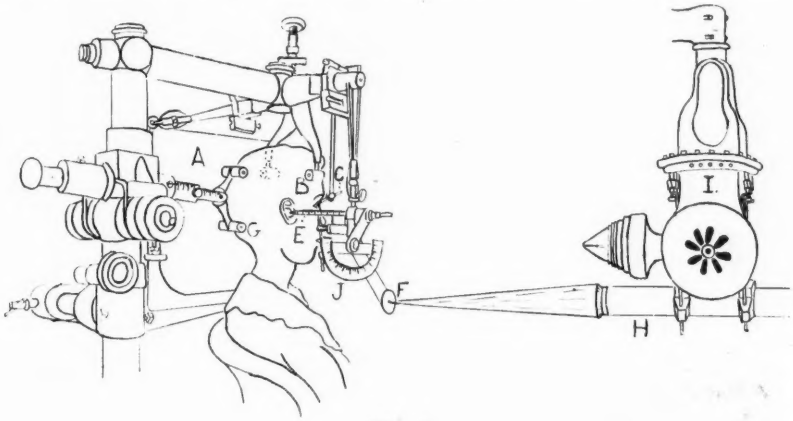


Fig. 3.

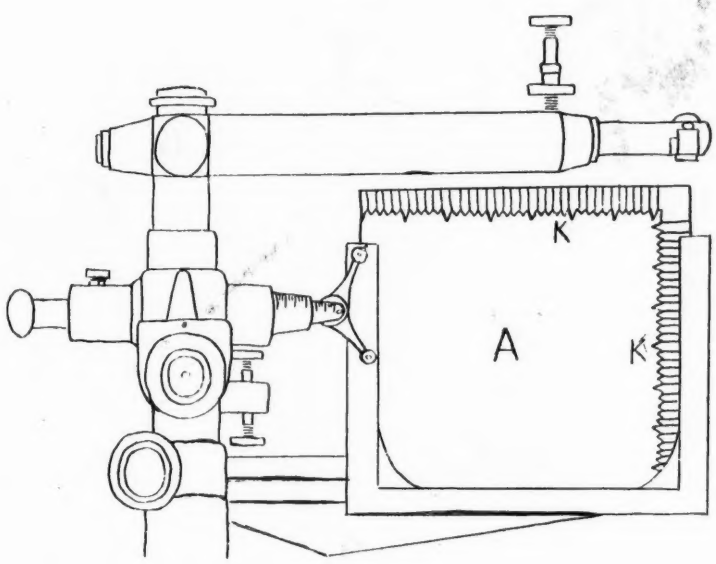


Fig. 4.

definitely positioned within the framework. The duplication of position of the head relative to the x-ray machine is made by means of focusing a beam of light from a telescope which is fastened to the machine. The focus is made upon the center of the target which is fastened to the framework. The position of the target relative to the head is definite and recorded by the various calibrated gauges, as stated.

The manner of positioning the head preparatory to making the exposure for the production of the lateral plate is herewith described.

The head is positioned first, relative to the calibrated adjustment rods, EE′ (Fig. 1), to be received in the ear holes. The readings of the distance from end of rods to surface on respective suspension arms are recorded. The head is leveled in the horizontal plane relative to the ear rods in position by adjustment bilaterally of the level gauges, LL′, which are mounted on adjustment arms.

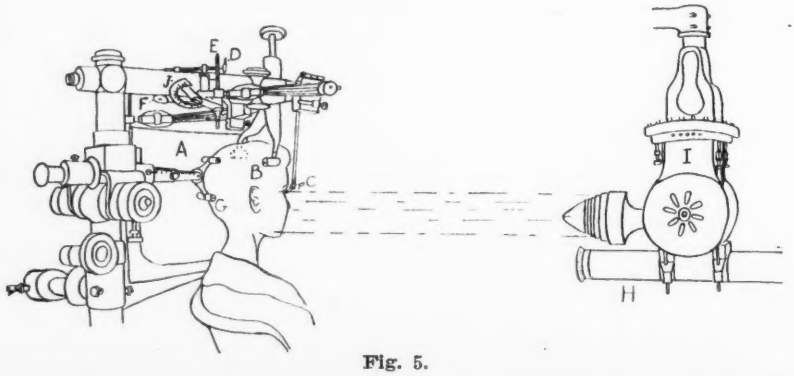


Fig. 5.

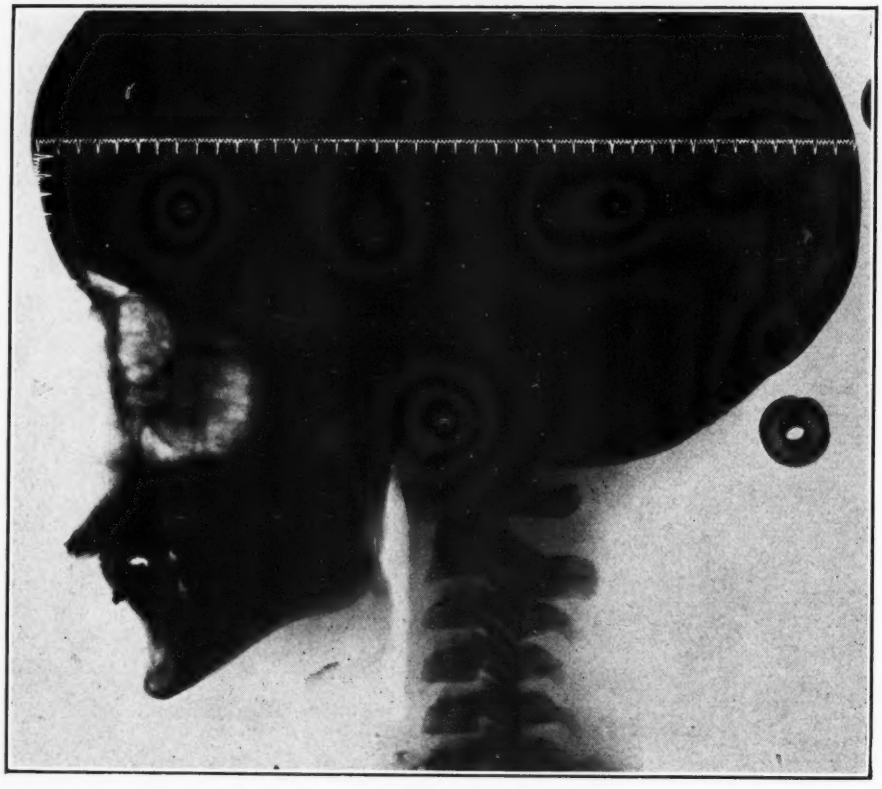

Fig. 6.

These arms extend from the suspension arms, which carry the ear hole rods, to the other terminal which is the orbitale feeler point. The points are positioned when the orbitales have been palpated. The extension arms which carry the level gauges terminate by two adjustment extensions, so situated that they intervene between the level gauges and the final point terminations, or the

orbitale feeler points. These two adjustment extensions are each calibrated, D and D′ (Figs. 1 and 2) and the readings are recorded from each, bilaterally to the head, after their adjustment permits of the level gauge readings with the ear rods in position. The head is now securely positioned in the Frankfort horizontal plane.

The calibrated extension arm which offers two point support to the occiput is next positioned securely to the surface of the head and the reading is recorded, G (Fig. 2).

The frontonasal extension support arm is next adjusted to the nasion for further fixation of the head, C (Figs. 1 and 2).

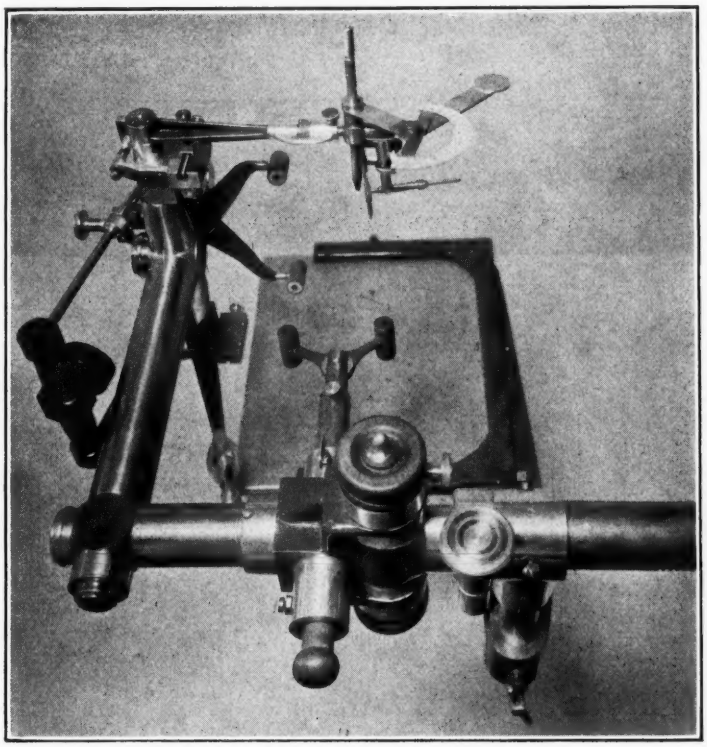

Fig. 7.

The parietal extension arm support, B (Figs. 1 and 2), is next adjusted to the head and locked to position.

The central, principal extension arm which carries the ear rod and the further extension arm to the orbitale on the side of the head which is toward the x-ray machine also carries a circular calibrated gauge, J (Fig. 2), which is mounted with an adjustment protractor. The protractor terminates with a dot, F (Figs. 1 and 2), in the center of a circular target. This point is the point of focus for a beam of light projected from the telescope, H (illustration 3 and 5), which is mounted upon the x-ray machine, I (Figs. 3 and 5).

In the next preparation for the exposure, the light is so focused from a cross-section hairline field view in the telescope and the reading is so recorded of the angulation of the protractor to the circular gauge.

The instrument permits of variation in the position which bounds the field of the central ray as determined by the angulation set for the protractor; however the target F is always 2½ inches below the central ray and it is always and definitely so fixed.

The cassette, A (Figs. 1-5), carrying an 8 x 10 film with intensifying screen, is mounted and securely positioned in the recess within the frame to receive it on the opposite side of the head from the x-ray machine. The cassette frame is provided with a calibrated scale on the sides, K (Fig. 4), which intercepts the rays and thus provides the gauge as shadowed upon the film, for use in recording the distances of various readings when the film is studied and mensurations are made.

The head being securely positioned in the Frankfort horizontal plane and all readings having been recorded with the beam of light focused upon the center

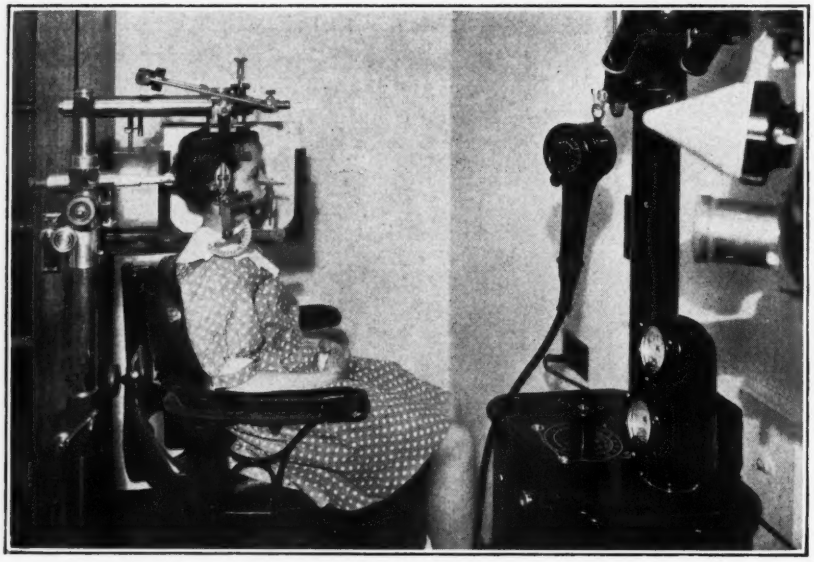

Fig. 8.

of the target, the field is cleared of mechanism for the exposure. The apparatus is next swung to position of retraction as shown in Fig. 5. In this position, the occipital, parietal, and frontonasion extension arms only remain in position to prevent any movement of the head during exposure. Previous to exposure, lead points are placed in the ear holes to record the porion points on the film, the ear hole pointers having been removed with retraction of the apparatus. Fig. 6 shows a view of a typical lateral plate with markings of some principal anatomic points for study film. Fig. 7 is a close-up illustration of the apparatus for clearer view of structural details. Fig. 8 shows application of apparatus to patient's head during the procedure of making calibrated readings.

One Hanson Place.

# SCIENTIFIC AND PRACTICAL IMPORTANCE OF FACIAL TELEROENTGENOGRAPHY*

G. KORKHAUS, D.M.D., BONN, GERMANY

THERE can be no doubt that the teeth and their functions take an important part in the formation of the facial skeleton. Unfortunately, the difficulties encountered in the investigation of the very complicated relations of the facial

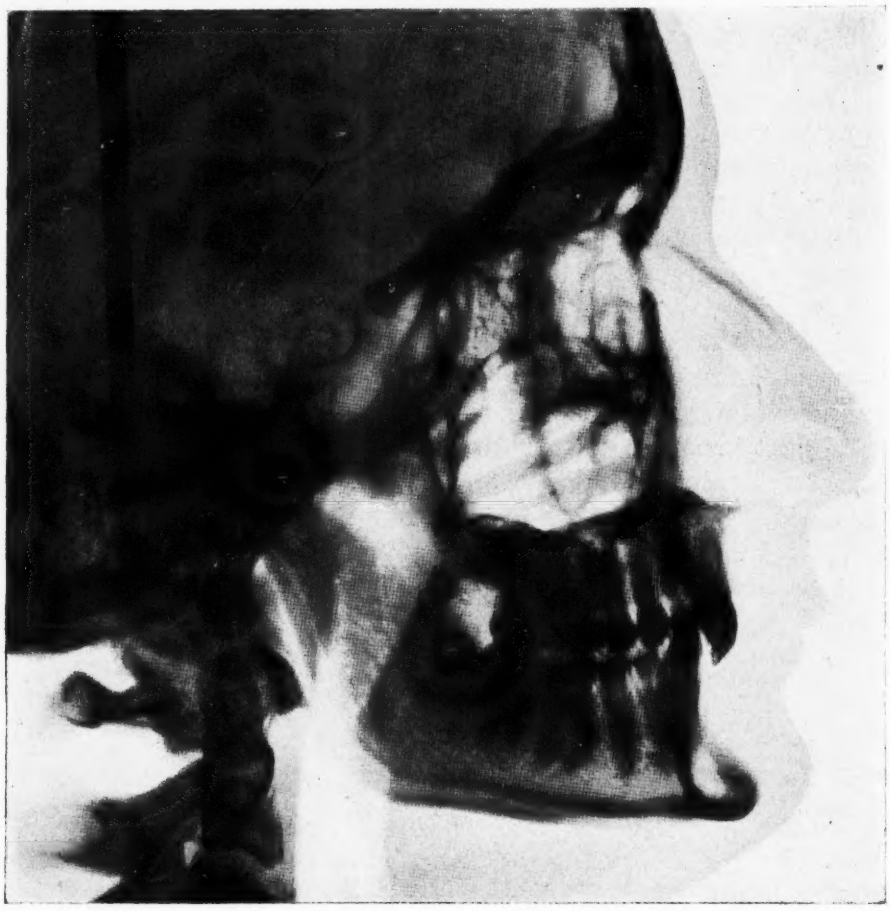

Fig. 1.

skeleton have led to the fact that we possess today only a superficial knowledge of the external, visible, individual, sexual, and age differences of the structure of the skulls of various races and their cross-breeds. At a time when nothing could be learned about the real form and thickness of the covering soft parts, a genetic analysis of the facial parts, both separately and of their interrelationship, could not hope to be very successful.

*Demonstration before the European Orthodontological Society, Scheveningen, 1934.

Also in orthodontia, an exact knowledge of the influences which are exercised upon the skull and face by pathologic factors in the origin of jaw anomalies or by abnormal functions of the teeth have hitherto remained obscure—influences which cannot only lead to well-known orthodontic irregularities, but also to typical deformities of the facial skeleton.

Teleroentgenography made at a distance of 2-3 mm. or more (Hofrath) permits a much deeper knowledge and presents further great and unexplored possibilities. This teleroentgenography gives undistorted pictures with the finest reproduction of the soft parts of the profile and the facial bones at the same time (Fig. 1). They show all the essential details of the structure and the composition of the facial skull, all connections between the alveolar process and the jaw, the relations to the prosthion and the subspinal point, to the infradental and the gnathion, the form of the jaw angle and the proportion of the mandibular processes, signs of certain favorable or unfavorable tendencies in development. These can all be seen with perfect clarity. If desired, an orbital projection (orbital plane of Simon) may be made, giving a plastic impression of how the denture is fitted into the skull. When the peculiarities of the structure of the skull visible on the teleroentgenograms, or a sufficient number of orthodontic anomalies, have been investigated, we will have advanced another great step in our endeavor to ensure that all shall attain as nearly as possible the goal of natural individual development.

This technic affords an unexpected insight into the nature of pathologic development, and also enables us to follow the course of development and the consequences of our therapeutic endeavors, so that teleroentgenography will become the most important instrument in orthodontia, and undoubtedly the best method of determining maxillofacial relations.

# INDICATED TRENDS IN DENTISTRY FOR CHILDREN

## I. Diet and Dental Health*

Frances Krasnow, Ph.D., New York, N. Y.

NOTWITHSTANDING the recent importance attributed to diet in its relation to tooth health, the fundamental idea is not new. It dates back about 1,800 years. Apparently little progress has been made because the individual factors responsible for normal metabolism were practically unknown a few decades ago. Rapid discovery of fundamental principles has aroused keen interest in their application.

Teeth, as living tissues, must be progressively and continuously nourished. The conditions for health and life of the tooth are associated directly or indirectly with those conditions which make for the health and life of the body as a whole. The fact that one person in presumably good health has decayed teeth and another in poor health has excellent teeth must not be interpreted as an argument against such correlation. Thus, a person in apparently good health may have chronic tonsillitis and one in poor health never be troubled by such inflammation.

It is true that all points involved in the correlation between the metabolism of the teeth and that of the organism in toto have not yet been brought to the fore. Moreover, all of those which have been suggested are not yet accepted as fact. More data are needed, and there is no better way of accumulating them than by concerted action on the part of all who can help—physicians, dentists, laboratorians. Intelligent and conscientious handling of cases will bring success in some and a better understanding of what is wrong with others.

Broadly considered, human well-being is dependent upon individual and community hygiene. In reality, community hygiene is unattainable without scrupulous individual hygiene—so the starting point in the consideration of health should be the control of the factors involved in obtaining individual hygiene. They are:

I. Freedom from formed poisons (pathogenic bacteria and microorganisms generally) and unformed poisons other than those originating from infection (chemical substances of various constitution);

II. Careful attention to physiologic requirements (other than food intake) as determined by medicodental clinical and laboratory examinations. Sufficient rest to take one through the daily tasks without the feeling of fatigue ought to be particularly stressed;

III. Proper diet (including proper supply of oxygen).

*From the Murry and Leonie Guggenheim Dental Clinic.
Presented before the Section on Dentistry for Children, Second District Dental Society, Brooklyn, N. Y., Nov. 25, 1935.

TABLE I

| MINERAL | DAILY REQUIREMENT (GRAMS) | REPRESENTATIVE FOODS | FUNCTION |
|---|---|---|---|
| Calcium | 0.6 - 1.0 | Milk (milk products), lentils, spinach, celery, chard, lettuce, carrots | Bone and tooth structure.<br>Regulation of blood coagulation.<br>Regulation of iron metabolism.<br>Regulation of heart action.<br>Regulation of enzyme action.<br>Regulation of osmotic pressure relationships. |
| Magnesium | 0.18 - 0.30 | Animal and plant food generally | Interrelationships with calcium, potassium, and sodium. |
| Iron | 0.006 - 0.015 | Eggs, lean meat<br>Lentils, kale, spinach, beets, carrots<br>Bananas, apricots, peaches | Hemoglobin building.<br>Chromatin building.<br>Oxidation metabolism.<br>Closest possible relation to the fundamental processes of nutrition. |
| Copper, manganese | Extremely minute amounts | Beans, vegetables, fruits | Associates of iron in its tasks. |
| Potassium | 2.0 - 3.0 | Vegetables and fruits generally | Interrelationships with calcium, sodium, magnesium.<br>Regulation of acid-base balance.<br>Necessary for erythrocyte and muscle activity. |
| Sodium | 4.0 - 6.0 as NaCl | Meat, vegetables, fruits | Interrelationship with calcium, potassium, magnesium.<br>Regulation of acid-base balance.<br>Stimulates appetite.<br>Excites thirst. |
| Phosphorus | 0.8 - 1.5 | Milk (milk products), eggs, beans, spinach lettuce, cauliflower, celery, carrots | Regulation of acid-base balance (phosphate salts).<br>Bone and tooth structure.<br>Phospholipid, Phosphoprotein, Nucleoprotein } building.<br>Regulation of osmotic pressure.<br>Rôle in sugar metabolism.<br>Rôle in creatine-creatinine metabolism.<br>Rôle in guanidine metabolism.<br>Rôle in enzyme activity. |
| Iodine | 0.00001-0.00002 | Sea foods. Vegetables and fruits of localities where soil is rich in iodine | Manufacture of thyroxin.<br>Regulation of normal growth and health.<br>Controls goiter, cretinism, myxedema, Graves' disease. |
| Sulphur | 1 gram to 100 grams of protein | Eggs, vegetables | Regulation of oxidation metabolism.<br>Manufacture of glutathione.<br>Manufacture of insulin.<br>Rôle in structure of vitamin D, taurocholic acid, thioneine, methionine, thiocyanate. |
| Fluorine | | | Enters the structure of bone and teeth as apatite compounds with calcium, phosphorus and magnesium.<br>Excess over 1 part per 1,000,000 recently associated with mottled enamel.<br>Enters in mechanism of blood coagulation.<br>As a calcium precipitant it may affect calcium-phosphorus metabolism.<br>Usually inhibits enzyme action. |

The close interrelationship of these factors precludes an entirely independent treatment of any one of them. Thus, diet analysis, unless viewed as part of such a comprehensive scheme, will not bring effective results. A proper diet defined on the basis of data available at present is one which supplies the body with the substances necessary to build and repair tissues and to create heat and energy. Since life begins in utero, the foundations of normal well-being depend upon the supply of these essential materials made available through the mother, the health of the latter not being of lesser importance. They may be conveniently classified as:

A Proteins (including the amino acids essential for maintenance and growth)
B Lipids (including the essential fatty acids, such as linoleic and linolenic acids)
C Carbohydrates
D Minerals (12 to 15 in number)
E Vitamins (at least 6 in number)
F Water
G Roughage

To explain the rôle of all of these in detail is beyond the scope of this article.

A. *Proteins* (primarily contained in meats, fish, eggs, cereals) supply the body with amino acids, at least twenty-two in number, used to build and repair tissue. The daily requirement is usually placed at approximately 15 per cent of the total caloric intake—increased for children, decreased for the aged. They are potentially acid producing.

B. *Lipids* (primarily contained in milk products, meat fat, fish oils, vegetable oils, nuts) supply heat and energy. The amount required by an adult is usually given as 35 per cent of the total caloric intake. Normally excreted as carbon dioxide and water for the most part, they do not deplete the alkali of the body to any great extent permanently.

C. *Carbohydrates* (occurring mainly in cereals, fruits, vegetables) yield heat and energy. They should be taken in amounts equal approximately to 50 per cent of the total caloric intake. There is no permanent withdrawal of body alkali because the chief end products are carbon dioxide and water.

D. *Minerals* vary both in daily requirement and function. Table I characterizes the most representative ones.

E. *Vitamins* protect against the so-called deficiency diseases—each vitamin being associated with a particular malfunction in addition to cooperative duties every essential food fulfills for general metabolic economy. (Table II.)

F. *Water* is extremely important for the general tone of osmotic pressure, for the regulation of body temperature, for preventing friction of tissues by keeping them moist, and aids markedly in peristalsis. Eight glasses of water (including fruit juices and bouillons) are usually considered the necessary daily intake.

G. *Roughage* supplied essentially by leafy vegetables should be taken daily in amounts ranging between 300 to 400 grams. This food controls peristalsis,

thereby preventing stagnation and putrefaction, and in addition is a valuable source of vitamins and minerals.

TABLE II

| VITAMIN | DAILY REQUIREMENT IN FOOD EQUIVALENTS | FUNCTION |
|---|---|---|
| A | 720 grams of milk<br>2 eggs<br>30 grams of spinach<br>45 grams of carrots<br>2 teaspoonfuls of C.L.O. | Specific against xerophthalmia.<br>Rôle in appetite, digestion, growth, reproduction.<br>Aid against infection, particularly of upper respiratory tract. |
| B | 720 grams of milk<br>2 eggs<br>Vegetables, fruits | Specific against beriberi.<br>Rôle in appetite, digestion, growth, reproduction. |
| C | 720 grams of milk<br>45 grams of spinach<br>24 grams of cabbage<br>30 grams of canned tomatoes | Specific against scurvy.<br>Rôle in maintenance of appetite, health. |
| D | 2 eggs<br>2 teaspoonfuls of C.L.O. | Specific against rickets.<br>Rôle in proper absorption, retention of calcium and phosphorus. |
| E | Quantity unknown<br>Grains and seeds<br>Fresh green vegetables | Specific rôle in reproduction. |
| G | Quantity unknown<br>Fresh green vegetables<br>Glandular tissues | Specific against pellagra.<br>Rôle in growth. |

Thus may be outlined the needs of the body as a whole. Which of these are of particular interest for tooth metabolism? Frankly answered—All! No one of them can, in reality, be considered apart. Special attention, however, should be given to those factors which may be low or lacking in some dietaries: calcium, iron, iodine, vitamins C and D, potentially alkaline foods, proper balance among foods.

# DIAGNOSIS IN CHILDREN'S DENTISTRY

H. C. Wittich, D.D.S., St. Paul, Minn.

THE real possibilities of practicing prevention in the field of children's dentistry have not heretofore been fully realized by the dental profession. Volumes have been written concerning prevention in dentistry, but dentists have seemingly failed to associate it with that branch of dentistry wherein it may definitely find fruition. We are told that the condition of our health in later years of life depends upon the care and precaution we have taken during our earlier years. If this be true, then the earlier we apply preventive measures of dentistry, the more comfortable and healthy the later years will be.

Just recently I saw a cartoon in which a member of the dental profession, upon examining a child, apparently six or seven years of age, advised the parent that nothing should be done, for it would be but a short time before the baby teeth would be lost; in turn, the parent upon leaving the office, very indignantly informed the dentist that her child's health was just as important as her own. This is the secret of the practice of children's dentistry in its broadest scope, when the element of health plays the important part.

It may be argued that the filling of a deciduous molar in a five-year-old child has very little to do with the child's health; but should this molar not be taken care of and filled, and the decay be allowed to continue until an abscess is formed with the secondary development of heart or kidney conditions, then the filling of this deciduous tooth would truly have been a preventive measure.

If we can replace the words which we so often hear, "Oh, this is just a baby tooth and will soon be lost," with the following words, "Your child's physical development is largely dependent upon a healthful condition of his mouth and teeth," a big step will be taken in the right direction for the advancement of prevention in children's dentistry.

The promotion of children's dentistry rests both with the parents and with the members of the dental profession. First, we may consider the parents' side, and observe just what is being done to educate them in the values of caring for their children's teeth. There are the parent-teacher associations, mothers' clubs, child psychology groups, radio programs, and many other organizations which include in their programs lectures on the necessity of dentistry for children. In this connection, let us observe what is being done to educate the child.

There are being conducted semiannual school examinations, room checkups, daily toothbrush drills, educational talks by dental and medical nurses, free dental clinics operated by private individuals, by school boards and by women's dental auxiliaries in an effort to interest the children in their teeth with relation to their general health. And back of almost every movement to bring dental education before the public is a dentist, a dental society or an

oral hygiene committee of a dental society. This being true, the fact that there are still a number of children not taken care of must mean that our educational methods are not entirely effective or that the members of the dental profession, themselves, must not be doing their part. The educational programs, however, for the most part have been successful at least in arousing the interest of the laity. More than ever before, parents today are aware of the importance of their children's deciduous teeth, especially in relation to health, mastication, proper jaw development, and in their immediate relationship with the permanent teeth. Yet in the face of these facts, there is a charge against the dental profession of which many are guilty and we must face the facts with some degree of frankness. The truth is that while writers and lecturers have been stressing the importance of the deciduous teeth—that these teeth must be preserved until their successors are due to appear—when parents *do* bring their children for dental attention, the dentist often refuses to take care of the deciduous teeth and advise that "it is not necessary now, for they are soon to be lost anyway."

This practice surely is not consistent with our educational programs, and, unless we practice what we preach, we can no longer expect the laity to have confidence in us. Of course, there are several legitimate reasons why all dentists do not wish to take care of children, but there can be no excuse in cases in which the parents are willing and eager to have the dental work done and the dentist, not wishing to undertake it himself, refuses to refer the children to a member of the profession who is willing to do this type of work. There are many men in general practice who do no extractions, but they do not allow their responsibilities for extractions to drop in cases in which extraction is indicated. They make arrangements to have this service rendered by one who does it, and that is what is expected and required of a dentist who does not wish to work for children. His responsibility to the child who comes to the office for attention, if he does not wish to give this service, is to see that the child is placed in the hands of one who does take care of children. Certainly no reflection is cast upon the dentist who has no desire to take care of children's dental needs, for many realize their limitations in this particular line of work in the managing or handling of children. I should urge every member of our profession, however, to do everything in his power to see that the child is placed in proper hands for this necessary work.

*Diagnosis.*—Diagnosis starts with the very first contact we have with the child. The diagnosing of the type of child with which we are to deal is of great importance and will, in many instances, aid materially in our method of procedure. It is a psychologic fact that early emotional experiences have a permanent effect on one's attitude toward a specific situation. Most children come into a dental office with some knowledge of what takes place, and it is upon this first visit that possibly the child's entire future attitude toward dentistry is dependent. We realize that all children cannot be treated in the same manner, and the sooner we are able to differentiate between the various types, the more successful will we be in our dealings with children.

*Reception Room.*—The greeting given to the child in the reception room by the dentist or his assistant cannot be overlooked. A child who comes for the

first time, regardless of what former knowledge he may have had about the dental office, is placed in an entirely new situation and in strange surroundings. The child's first name should be learned before he makes his first visit, and greeting the child by his first name upon his entering the reception room creates a friendly atmosphere. Often just this little act is sufficient to change the child's attitude toward the dentist. I believe that all children who come for their first visit should be allowed to remain in the reception room for a few minutes before being taken into the operating room for examination. This, again, permits the child to become acquainted with his new surroundings, and where a little forethought is applied and books and toys especially adapted for children are provided, soon the newness of the room wears off and his strange feeling disappears.

A child's disposition usually manifests itself in the reception room, but if not revealed there it can soon be determined in the operating room. The average child brought to a dental office for treatment may be placed in one of three classes: normal, nervous and fearful, or stubborn. The child classified as a normal child, one who cooperates in all respects, is, of course, the easiest to handle. This type needs only to be watched that the appointments are not of such length as to be tiring to the child.

The nervous and fearful child is possibly the one who presents the most difficult problem. Occasionally it is not advisable to do any work for this child at the time of the first visit; it may be merely a matter of getting acquainted with the child and letting him get acquainted with you. A great deal of kindness and explanation will be required, and it sometimes is well to allow this child to be present when work is being done for a child who does not abhor dental work and who readily cooperates with the dentist. This type of child, however, when handled properly usually makes a very good patient and almost always remains as such.

The child who is stubborn or obstinate in many instances requires only one visit in which to overcome this trait. This may be a long one if the dentist will make it a point to hold out, be firm but kind, and break through this obstinacy, showing the child who is master of the situation and that he must do as he is told.

A complete diagnosis of conditions present in the child's mouth is essential at the first visit. The examination requires a thorough understanding of all phases of dental development, dental pathology, and the operative dentistry that pertains to the case in hand. Not only should the number of cavities and missing and abscessed teeth be noted, but just as important is the occlusion of the teeth, the external facial contour, the general physical condition, a complete history of childhood diseases, history of parents' dental work, supernumerary teeth, and radiographs.

*Cavities.*—The finding of all cavities is also very necessary, and in a great many cases x-ray pictures are of value in helping to discover the smaller cavities. The regular dental film can be used as a bite-wing film in smaller children, and in older children the regular bite-wing film may be used. Occasionally it is necessary to resort to film No. 0 for very small children. No matter how small the cavity may be, it should be taken care of and not permitted

to develop, for it may be several months before the child again visits the dental office, and this cavity may by that time have grown to such an extent that the tooth will be lost.

*Abscessed or Exposed Pulps.*—All abscessed teeth or teeth with exposed pulps, unless treated, should be removed and not allowed to remain in the mouth as space retainers. The child's health at all times should be safeguarded, and I believe that if these abscessed teeth are allowed to remain, some secondary condition may be set up which may prove a serious handicap to the child's health.

*Occlusion or Malocclusion.*—It is very important that the occlusion be noted and precaution taken to prevent any malocclusion from taking place. At the earliest sign of malocclusion, the parents' attention should be called to it; and, if it is believed advisable not to treat at the time, a notation should be made to that effect, and upon subsequent visits this should be very carefully watched. When malocclusion is first discovered, the cause of the condition should be sought out, and it might be that simple, corrective measures can be applied to prevent a really serious case of malocclusion resulting. Some of the causes of malocclusion are: early loss of deciduous teeth; lack of development; habits, such as mouth-breathing, lip- or thumb-sucking; heredity; lack of eruption of deciduous or permanent teeth; and supernumerary teeth.

*Facial Contour.*—The external facial contour should be noted in order to detect any malformation of the jaws. Occasionally a child has the habit of lying on one side, tucking the covers or playthings, such as dolls, under the mandible, which, over a period of time, may deform the facial contour. This cannot always be observed by noting the occlusion of the teeth, but the external appearance must also be carefully taken into consideration.

*General Physical Condition.*—The general physical condition of the child will determine to some extent the length of appointments and the advisability of devitalizations, and will prove to be an entering wedge for a constructive talk with the parent on diet. A child who is in an extremely undernourished physical condition cannot tolerate the lengthy appointments which the strong, sturdy child does not mind in the least. In such cases, almost never should a devitalization be undertaken, but a constructive talk to the parent should aid in building up the child's health.

*History of Childhood Diseases.*—A complete history of the child's diseases is of untold value. The late Dr. Rhobotham[1] said: "It is true that certain babyhood diseases that are attended by a fever often leave hypoplastic enamel in their wake. Because of this fact, every effort should be made to prevent the contraction of childhood diseases during their early years particularly. Hutchinson's teeth, which always exhibit a single half-moon concavity on the incisal edge of the central incisors, should not be confused with the many other types of hypoplasia that have nothing whatever to do with syphilis."

A child who has had a severe case of rickets presents in most instances with a large number of carious teeth and the possibilities of recurring decay.

*Parents' Dental Condition.*—A history of the parents' dental condition is often needed in helping to determine why deciduous or permanent teeth are

missing. Heredity must be kept in mind during an examination, and should the parent give a history of missing permanent teeth, this same condition must be watched for in the child. Not always does it hold true that because a parent has missing permanent teeth his or her children will also have missing teeth, but nevertheless it must constantly be kept in mind and watched for.

*Supernumerary Teeth.*—I believe that all supernumerary teeth should be x-rayed when they are first observed. Frequently these teeth are normal in their development as to shape, and it might be difficult to distinguish which one is the supernumerary tooth. With the aid of an x-ray examination one can see which tooth has no root absorption and can advise extraction of that tooth when thought advisable.

*Radiographs.*—By means of radiographs we may be able to determine the physiologic development or absorption, pathologic conditions of the roots, the presence of supernumerary teeth, the absence of certain teeth, the size of pulp chambers and developing cavities. It is essential that at the least indication of an abnormal condition radiographs be made, for by this means we are aiding materially in our earnest endeavors in prevention.

Unless one feels the importance of this branch of dentistry and sees its possibilities, surely he will not practice it as preventive dentistry. I know of no better "practice builder" than our child patients, for we must remember that the children of today are the adults of tomorrow. How pathetic it is to see a young child with several deciduous molars missing and two or more first permanent molars in such condition that it is not possible to save them. I have seen cases in which the teeth present were in such position that the only teeth in occlusion were the six maxillary and mandibular anterior teeth. What chance has that child to masticate food properly? What chance has he for jaw development and general physical development? These conditions can be prevented only by training the child to come for dental attention before these important first permanent molars erupt; then when he does come, the dentist must do everything within his power to save them for the child.

We have not yet reached perfection in children's dentistry. These phases as outlined, however, should assist us in putting into practice the motto, "Prevention." We may often become discouraged in our work with children and feel tempted to give it up, but let us always remember these words: "I expect to pass through this life but once; if, therefore, there is any kindness I can show, or any good that I can do to any fellow being, let me do it now, let me not defer it nor neglect it, for I shall not pass this way again."

REFERENCE

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# WHY CHILDREN HAVE CROOKED TEETH*

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I SHALL give a short résumé of the preventable causes of crooked teeth. At birth, the face and head form the greater bulk of the skull with the lower jaw quite negligible in proportion to it. As the body grows the skull grows with it, the lower jaw increasing in size and changing in form from a straight line from ear to tip of chin, growing downward and forward until it assumes a definite angle behind the last of its developing teeth. It usually makes much greater growth than other parts of the skull. If all conditions were ideal, with no disturbance of function from within the body and no pernicious influences from external forces, the jaw bones and the developing teeth carried within them would probably gradually grow to full maturity in proper form, size, and opposition to one another.

If the child is a mouth-breather from malfunction of the nose, a rhinologist should be consulted about the removal of the tonsils and adenoids. If this habit is allowed to persist, it will cause a V-shaped upper jaw with a protrusion of the upper front teeth and a catching of the lower lip under them. This is because the bones which form the roof of the mouth also form the floor of the nose. If air is taken into the lungs, through the mouth, the bones are pushed upward making the roof of the mouth high and the nasal cavity smaller. If air is taken in through the nose, the pressure is equalized by air held in the mouth, the natural action of the tongue in resting at the roof of the mouth aids in maintaining a normal nasal cavity and normal development of the jaw. The resultant protrusion of the upper front teeth is caused by the dropping of the tongue to the floor of the mouth accompanied by the loss of control of the lip muscles which keep those front teeth in their proper place.

Another disturbing factor is the introduction of supplemental feeding to the suckling of milk from the breast. The muscular action of the tongue, cheeks, and lips is lost because of the easy flow of the milk from the bottle through the rubber nipple. The force exerted by the infant during breast feeding helps develop the bones which form the lower facial portion of the skull and the facial muscles. This development is beneficial to the child when the baby teeth begin to appear. The proper action of the tongue and other muscles influences the growth of those bones and by stimulating muscle control prohibits any tendency toward malformation.

The first important developmental change is complete when all the baby teeth have erupted into their proper places. Care should be taken that the child is taught to masticate his food properly. The nutritional value of proper mastication, the value gained by the exercise of the face muscles plus the action of the teeth, must be vigorously encouraged. This aids in the

*A radio talk given in Chicago, Feb. 28, 1934, during the Mid-Winter Meeting.

growth of the face, jaws and teeth and the maintenance of the health of the mouth tissues by stimulation.

The second great developmental change takes place between the fifth and the sixth year. Prior to this there should be a spacing of the front teeth to make room for the permanent teeth, which replace the baby teeth. During this same period, the first of the big back grinding molars, which grow in only once and are never replaced, make their appearance. It is important to see that the proper forces guide these teeth into their natural positions. To maintain proper balance, baby teeth should be properly filled to hold the entire space occupied by the original tooth. Insertion of fillings restores the function of teeth, aids in mastication, and prevents the adjacent teeth from tilting forward and the tooth opposing it from growing downward.

If a temporary tooth must be extracted prematurely, an appliance or bridge should be inserted to prevent closure of the space. Teeth on either side of the extracted tooth drift; the back one forward and the front one backward, thereby imprisoning the permanent tooth in the jaw bone and preventing its eruption into its proper place, with a subsequent shortening of the jaw and a disarrangement of all other teeth in their relationship to one another.

It is just as dangerous to retain a baby tooth beyond the time for its replacement by its permanent successor. The root of the deciduous tooth can then force the growing permanent tooth to take a false position in the mouth, also unbalancing the relationship.

For the thumb-sucking habit so necessary for the child's rest and the mother's peace, the severest condemnation is not enough for any parent who permits it. Starting as a harmless and approved habit, it soon makes a nuisance of itself. The thumb pressure on the soft, supple and developing bones pushes the upper teeth and the bones that carry them forward and outward, and the lower front teeth and jawbone backward and inward. It creates a chinless and apparently insipid type of face. Its correction must be begun at its inception. First, trial must be made to break the habit by removing the thumb from the mouth, and, if the child is old enough, by persuasion. If this is not successful, more drastic steps must follow, calling for the wearing of gloves, the application of bad-tasting drugs, mechanical devices on the thumb, or for younger children an arm bandage, a mailing carton covering the elbow, or tying the end of the pajama sleeve over the hand.

The use of pacifiers and the habit of nail biting are condemned as harmful. Finger-sucking has a similar and devastating effect. If the fingers are carried into the mouth with the palm of the hand inward, the lower jaw and teeth are pushed outward and forward, and the upper teeth are depressed. The child's chin is brought forward, indicating a pugnacious strain which is often belied by every character in that child's make-up.

Tongue biting and cheek biting show themselves by keeping the teeth in one jaw from meeting those in the opposing jaw. Because of lack of exercise of the teeth and gums the teeth may be lost from pyorrhea in adult life. This lack of closure would interfere with the proper function in formulating proper speech, causing hissing, lisping, or both.

Bad posture habits have an influence on the soft, growing bones. Children, when studying or reading, curl themelves into unnatural positions, with their fists on their chins, the hand on either the left or the right side of the face, or a finger resting on the upper lip beneath the nose. These habits cause malformation of the jaws and malposition of the teeth, the movement being in the direction in which the force is applied.

The child should sleep on his back with his hands at his sides or comfortably folded on his chest. Sleeping on the stomach or on the side with the hands between the pillow and the cheek or even under the pillow leaves a marked and permanent defect. The face is depressed in one area or is higher in another, giving an unbalanced appearance.

Blanket biting, toy biting, or putting any object into the mouth influences improper development of the jaws and unbalances the proper closure of the teeth.

You should aid your child to maintain the proper balance of the teeth and the development of the jaws and face by continuing to have your child breast fed until teeth appear, by guiding the eruption of teeth into the mouth at the proper time, by having the temporary teeth properly cared for and filled, by maintaining the space caused by the premature loss of the baby teeth. Watch for the developmental changes in the jaws from the baby to the permanent teeth; watch the permanent and irreplaceable molars take their places in the mouth; prevent or correct mouth-breathing, thumb- and finger-sucking, nail, cheek, tongue, blanket, and toy biting; and discourage the use of pacifiers, bad postures, and pillowing habits.

There are many more avoidable causes, but in the short time allowed for this talk it is impossible to cover them all. I hope that I have impressed the value of prevention over cure.

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## SURGICAL CORRECTION OF DEFORMITIES OF THE JAWS AND ITS RELATION TO ORTHODONTIA

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THERE is a closer relation between orthodontia and plastic surgery than many persons would suspect. The aim of both specialties is to correct deformities. It is true that the deformities an orthodontist is called upon to correct are different from those encountered within the field of surgery, and different methods are used to gain a result in the respective fields. But, because of an identity of purpose and a common field of activity, there is likely to be some overlapping between these specialties; yet they frequently can cooperate for the common good.

I want to describe several types of deformities of the jaws which are of interest to both orthodontists and surgeons. These are divided into four groups:

(1) Mandibular prognathism.
(2) Unilateral retrusion of the mandible.
(3) Bilateral retrusion of the mandible.
(4) Secondary deformities in cleft palate patients.

### MANDIBULAR PROGNATHISM

In looking over the literature on the subject of mandibular prognathism one cannot help being impressed with the remarkable success the orthodontists have had in treating extensive Class III cases. Case[1] reported in his book a few difficult cases which he successfully treated. His method consisted of judicious extraction of selected teeth in the mandible followed by orthodontic treatment. However, another eminent orthodontist, Angle,[2] when discussing pronounced prognathism of the mandible, condemned orthodontic interference. He stated that these cases are good ones for an orthodontist to avoid and that the practitioner must recognize the limitations of regular orthodontic treatment. Angle naturally refers to extreme types and suggests operation. Since then, surgical operations in these cases have been performed in increas-

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ing numbers. In general, two types of operations have been developed. The first consists of making a horizontal cut through the ramus of the mandible somewhere above the occlusal plane of the teeth. The body of the mandible is then pushed backward to the desired position and immobilized until consolidation of the bone is complete. This operation is simple in conception, but its chief handicap is the occasional inability of the operator to control the posterior fragment. It was, however, first advocated by Babcock,[3] and successful cases are reported by Pichler,[4] Bruhn,[5] Kostečka,[6] and many others.

The second method consists of removing a measured section from each side of the body of the mandible, preferably in the first molar region. The

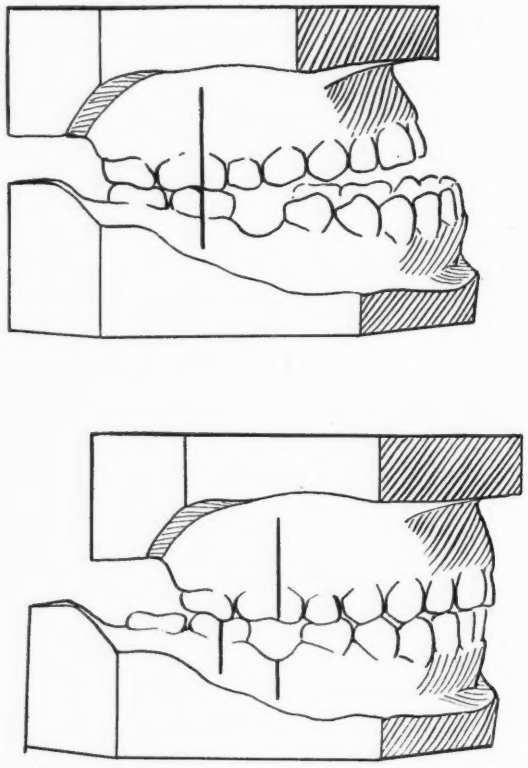

Fig. 1.—Diagram showing method of measuring the size of section of bone to be removed.

anterior fragment is then pushed back into its new position and immobilized with dental splints made previously for that purpose. This is the method Angle referred to, and he described the dental splints for the immobilization of the parts after operation. Blair[7] performed the first successful operation of this kind in 1898. Since then Ballin,[8] Willett,[9] and others have reported successfully operated cases. I reported five cases before the Second International Orthodontic Congress in London, in 1931, and described in detail the operative procedure as well as the method of fixation of the parts of the mandible.[10] Since then I have added three more cases to the number above. I shall not go into a detailed description of the various steps of this operation, but I will emphasize again the importance of preoperative preparation.

On the study models the exact location of the operation was determined to be about the mandibular first molar region. The measurements determining the exact size of the piece of bone to be removed are also made on the models. The following method of measuring is adopted. Study models are placed as in the existing condition and marked with perpendicular lines over the last molar region. Then the maxillary model is carried forward to assume the position that would result in the most satisfactory occlusion. The mark-

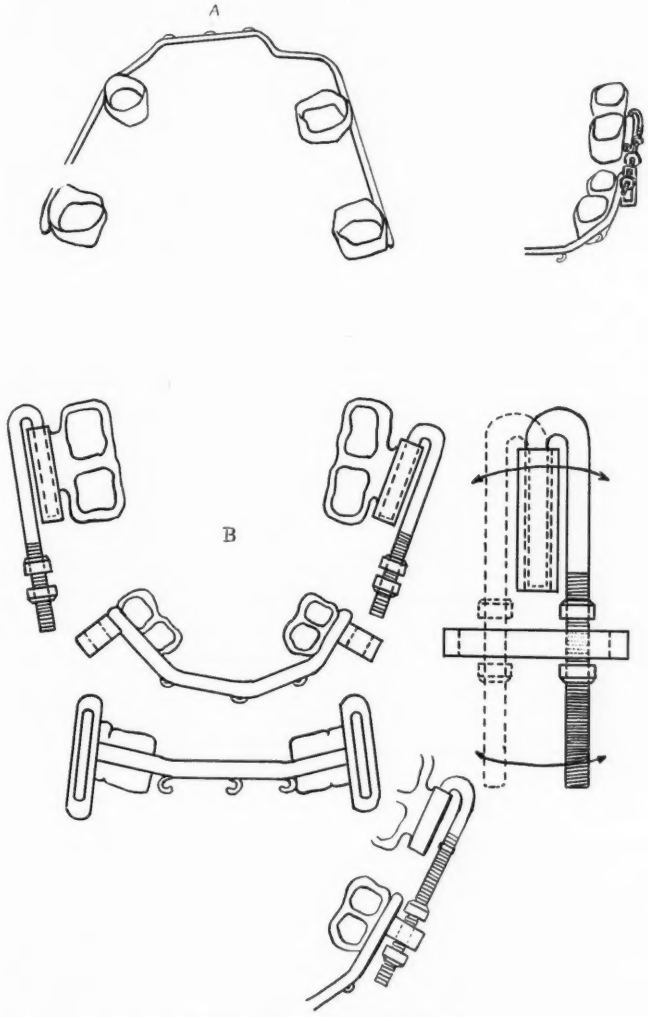


Fig. 2.—Diagram of splint.

ing of the maxillary model is extended down to the mandibular model, and the distance between the first and second lines on the mandibular model determines the amount of bone to be removed on each side (Fig. 1). Owing to the deviation of the median line these measurements on the right and left sides differ in most cases.

In addition to the preliminary work on the models, described above, it may be necessary to remove specific mandibular teeth at least one month before operation. If this step is left until a later date, the healing process will

undoubtedly be considerably delayed. The next step is to construct splints. In all cases approximately the same type of splint was used. Since it is not always possible to remove a section of bone with absolute accuracy of measurement, splints are made in an adjustable form to allow for effective immobilization of the parts.

The splints in the diagram (Fig. 2) show a retention splint fastened to the maxillary teeth and a mandibular splint in three sections. Bands are fitted over the posterior teeth and a round tube is soldered to the buccal surface. At least two anterior teeth are utilized on each side and fastened together with a stout wire. A vertical slot is soldered into the buccal side of these bands. After the operation the anterior and posterior bands are connected with a stout wire threaded on one end and hooked on the other (Fig. 2). The advantage of this procedure is that it allows for a readjustment to new positions as healing of the parts progresses.

Patients with prognathism of the mandible suitable for operation may be divided into three groups. The first group is characterized by a full development of the maxilla with a regular normal dental arch and a good facial outline, except for the extreme overdevelopment of the mandible. The second group is also characterized by extreme mandibular protrusion, but a close examination shows a definite underdevelopment of the upper half of the face. This type involves considerable irregularity and crowding of the maxillary teeth and a high palatal vault. The third group may not show pronounced prognathism but will have an open-bite with crowding and irregularity of the teeth.

In operating on the first type we find that good facial contour and definitely improved occlusion of the teeth are acquired. In the second and third types, however, additional orthodontic treatment is required either before or after the operation in order to obtain the desired functional as well as cosmetic effect.

In my series of cases I have found that while well-planned orthodontic treatment of the maxillary teeth prior to operation is highly desirable, it is not always practicable. Moreover, it seems to be easier for the orthodontist to plan the extent of the treatment he is to render after the operation rather than before. In my judgment the decision on whether or not a given case should be treated surgically or otherwise should be left to the orthodontist because I am aware that the surgeon, unacquainted with the possibilities of orthodontia, may overestimate the importance of surgery.

Surgical treatment of mandibular prognathism has passed through the stage of experimentation, and its operative procedures are pretty well standardized and simplified. The operation may even be performed under local anesthesia. The convalescing period is usually uneventful; that is, judging from the number of cases that have been under my care. In my series of eight cases only one developed infection and nonunion of the bone which subsequently had to be subjected to bone transplantation. This case, however, was unusual, and it is hardly fair to classify it with the usual run of prognathic cases. This patient was a young lady who had a very extensive hem-

angioma involving the lower half of the face, under the chin, and also the tongue and other parts of the mouth. She also had pronounced prognathism of the mandible. Her mandibular teeth were in rather poor condition with most of the posterior ones missing. The body of the mandible was greatly atrophied. She was given extensive x-ray radiation at the Massachusetts General Hospital, which reduced the hemangioma to a very great extent.

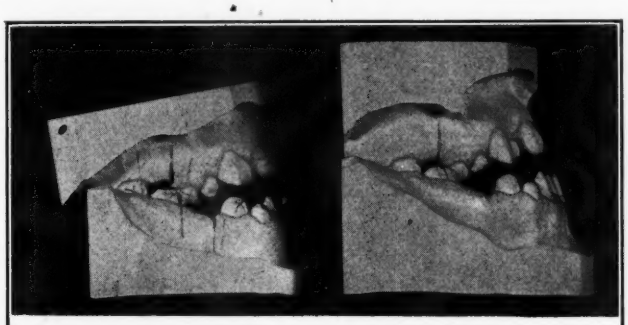

Fig. 3.

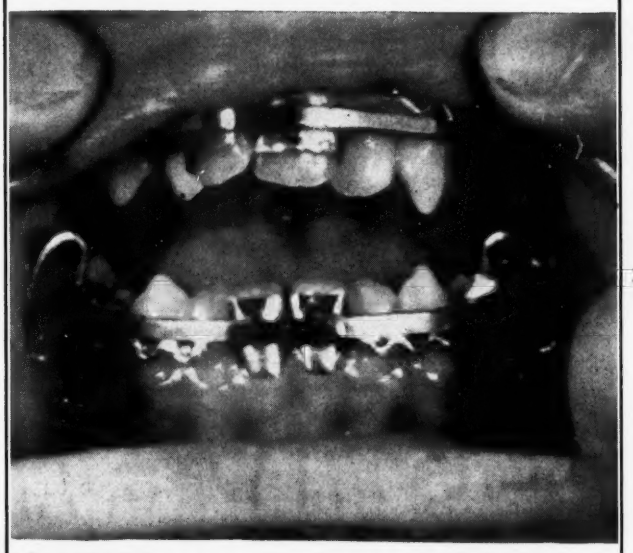

Fig. 4.

Fig. 5.

Fig. 3.—Preoperative models of patient, Case 1.

Fig. 4.—Preoperative photograph showing the amount of space anteriorly, while the molars are in contact; dental splints in position.

Fig. 5.—Postoperative photograph showing orthodontic appliances in position. Occlusion is almost normal.

Later, two operations were performed for the reduction of the protrusion of the mandible, one side at a time. Owing to the lack of efficient methods of fixation of the bone segments with dental splints, it was necessary to depend on direct wiring of the ends of the bone, which resulted in infection and nonunion on the right side while the left side healed satisfactorily. An osteo-

periosteal graft, however, was inserted later, and the eventual result, functional as well as cosmetic, was good. As I said before, this was an extreme case and was undertaken with a great deal of hesitation.

CASE 1. This patient, aged eighteen years, was seen in the Out-Patient Department of the Massachusetts General Hospital on Nov. 3, 1932. His chief complaint was prominence of the mandible which he claimed was causing him difficulty in speaking and chewing (Fig. 3). He had always been healthy. Aside from the usual children's diseases he has had no serious illness, and he does not remember any injury to the jaws.

His general physical examination was negative except that he had congenital syphilis which was manifested by a positive Wassermann test. He was referred to the Out-Patient Department for treatment.

Examination of his mouth showed moderate prognathism of the mandible complicated with a contracted maxillary arch, irregularities of the teeth, and open-bite. The space between the maxillary and the mandibular incisors measured 6 mm. while the maxillary and mandibular teeth were in contact only at the second molar area (Fig. 4).

In consultation with the orthodontic department of the Harvard Dental School it was decided to operate on the mandible and to bring the maxillary and mandibular teeth into as favorable occlusion as possible. This was to be followed by orthodontic regulation of the maxillary teeth in order to establish proper occlusion. The patient was referred to the Harvard Dental School for the construction of special splints similar to the diagram.

The operation was performed on June 3, 1933, under local anesthesia. A small incision was made over the alveolar ridge, and the mandible was exposed down to the lower border with a periosteal elevator. Another small incision was made at the lower border of the mandible through which the periosteum was completely separated from the bone. With a Gigli saw a measured section of the mandible was removed. This same procedure was carried out on the opposite side. The dental splints were then connected with wire hooks, and in addition the maxilla and the mandible were wired together. The patient made a good operative recovery and was discharged from the hospital on June 14. He was sent to the Dental School for follow-up care.

The patient was examined again on November 2, 1935. His teeth are being regulated by an orthodontist, Dr. Edward Silver. (Fig. 5.)

CASE 2. This young man, aged sixteen years, had a congenital familial deformity of the mandible with the mandibular teeth protruding several centimeters beyond the upper (Fig. 6). He was sensitive about his appearance and also stated he had difficulty in chewing. His past history was negative with the exception of chorea in childhood and a rheumatic heart. An operation for resection of the mandible was advised, and he was sent to the Harvard Dental School for construction of dental splints prior to the operation. These were cemented over the teeth before the patient was admitted to the hospital.

The operation was performed on July 16, 1934, under avertin-ether anesthesia. Incisions were made on the inner and outer gingival borders of the

mandible, first molar region, and the periosteum was separated from the bone. An external incision was made to connect with the inner border to provide a good exposure of the bone. With a Gigli saw, a section about one-half inch in breadth was removed. This same procedure was carried out on the opposite

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 6.—Preoperative photographs, Case 2.
Fig. 7.—Postoperative photographs.
Fig. 8.—Models of teeth, before and after operation.

side. A brass wire was then used to connect the dental splints. This wire immobilized the parts and brought the maxillary and mandibular teeth in contact. His operative recovery was uneventful, and he was discharged from the hospital on July 25 with instructions to return to the Dental School for follow-up care. The splints had to be readjusted from time to time as the

healing progressed. The final result was quite gratifying and made a considerable difference in the mental attitude of the patient (Fig. 7).

*Remarks.*—The patient's photograph does not show any evidence of prognathism of the mandible; yet, when the casts of the teeth are examined, they show extreme retrusion of the maxillary teeth and a space of 1 cm. between the maxillary and the mandibular central incisors. It is obvious that the fault lies in the underdevelopment of the maxilla. In order to create some kind of a practical occlusion it was decided to remove a section from each side of the mandible.

In making my measurements I have taken into consideration the future possibilities of orthodontic treatment so that I did not make any attempt to have the maxillary central incisors overlap the mandibular incisors but brought the mandibular teeth to slight distal occlusion, expecting the rest to

Fig. 9.—Typical picture showing unilateral deformity of the mandible.

be accomplished by regulating the maxillary arch. This is being done at the Harvard Dental School under the direction of Dr. Blumenthal. (Fig. 8.)

### UNILATERAL MANDIBULAR DEFORMITIES

The second type of deformity is characterized by delayed or arrested development of one side of the mandible. The picture of this type is quite typical (Fig. 9). On close examination, one finds the median line of the mandible deviated to one side and the chin is retracted. The contour of the lower border of the mandible on the affected side is more or less full, while on the opposite side it is approximately flat. Examination of the teeth may show a fair enough occlusion so far as the masticating power is concerned, but the contour of the dental arch is distorted in an unusual manner. If we take measurements from the center of the chin to the tragus of the ear, we find that one side is definitely shorter than the other. In some instances the differ-

ence is over 2.5 cm. Fundamentally, the primary deformity consists in the shortness of one side of the mandible while the irregularities of the teeth and distortion of the face are really secondary to the delayed development of that side. These unilateral deformities are rarely congenital. All the cases under my observation have given a history of early infection or trauma involving the distal part of the mandible. This infection probably affects one of the centers of ossification by disturbing the blood supply of the part, thus causing a retarded development of that part of the mandible. As the child grows and as the teeth gradually begin to erupt, they naturally become crowded, irregular, and distorted to various angles.

In my opinion it is useless to try orthodontic treatment in these cases as the principal means of correction, because there is no way of elongating the mandible except by surgical operation.

The correction of such deformities consists, primarily, of lengthening the short side of the body of the mandible by surgical means and, secondarily, of adjusting the occlusion by orthodontia or by prosthetic restoration. Various surgical procedures are used for the elongation of the short side of the mandible. First, the body of the mandible may be cut through vertically and the parts separated to a desired length until the symphysis is at the median line, and the segments held in position by retention appliances previously prepared for this purpose. Later the gap is bridged over by a transplantation of bone. The second method is to cut through the body of the mandible in an oblique or L-shaped manner, so that when the two parts of the mandible are separated the extreme ends may be wired together. This method in suitable cases is preferable to the first because it obviates a second operation for bone grafting. In operating on such cases one is obliged to disregard the occlusion of the teeth entirely. Not infrequently, the teeth on the healthy side of the mandible assume an extreme buccal occlusion. Once bony union has taken place, however, orthodontic treatment will compensate for the resulting occlusal deformities. This is especially true in young patients, but in older patients the teeth are often so badly distorted or neglected that the only possible secondary correction consists in prosthetic restoration.

Occasionally children between the ages of five and ten years with such deformities are brought to me for examination, and I find it difficult to give intelligent advice to the parents. Orthodontic treatment at such an early age is to my mind disappointing. On the other hand, surgery before the eruption of the permanent bicuspids does not seem to be logical. Therefore, for the present at least, I prefer to wait until the patient's permanent bicuspids have fully erupted before surgical treatment is to be undertaken, and then orthodontic treatment can follow immediately.

Case 3. This patient, aged thirty-six years, gave a history of an abscess of the left mandibular molar thirty years before, which resulted in osteomyelitis of the jaw with loss of a considerable amount of bone on the left side. Examination showed considerable deformity of the lower part of the face in addition to nonunion of an old pathologic fracture. The mandible was short and deviated to the right, while the chin was retracted. The remaining teeth of

the mouth were neglected, having many cavities and broken-down roots. The patient was sent to the Harvard Dental School with instructions to have the broken-down roots removed and to save as many teeth as possible, at least temporarily. He was also to have a dental splint constructed preparatory to operation.

On April 26, 1934, the patient was operated upon under local anesthesia at the Massachusetts General Hospital. Two per cent novocaine and adrenalin solution was infiltrated about the tissues of the mouth on the left side. The

Fig. 10.

Fig. 11.

Fig. 10.—X-ray picture of patient, before operation, Case 3. Note the amount of missing bone of the ramus.

Fig. 11.—Photographs of patient before and after operation, Case 3.

fibrous bands and adhesions were cut through, and the mandible was allowed to come forward to an extreme right position, and immobilized in that position. The patient was discharged from the hospital May 3. On June 21 he was readmitted to the hospital. By this time the operative wound within the mouth had healed, and the mandible was held firmly in its new position by dental splints.

Following the first operation there was marked improvement in the facial contour, except for the unnatural depression on the left side of the face.

The second operation was performed on June 22 under ether anesthesia. An incision was made along the left border of the mandible, extending from the lobe of the ear downward for two inches. The distal border of the mandible was exposed quite freely. Considerable difficulty was experienced in locating the remaining part of the ramus, which was buried into the cheek tissue. Bleeding was stopped and three pieces of a thick osteoperiosteal graft were

Fig. 12. Fig. 13.

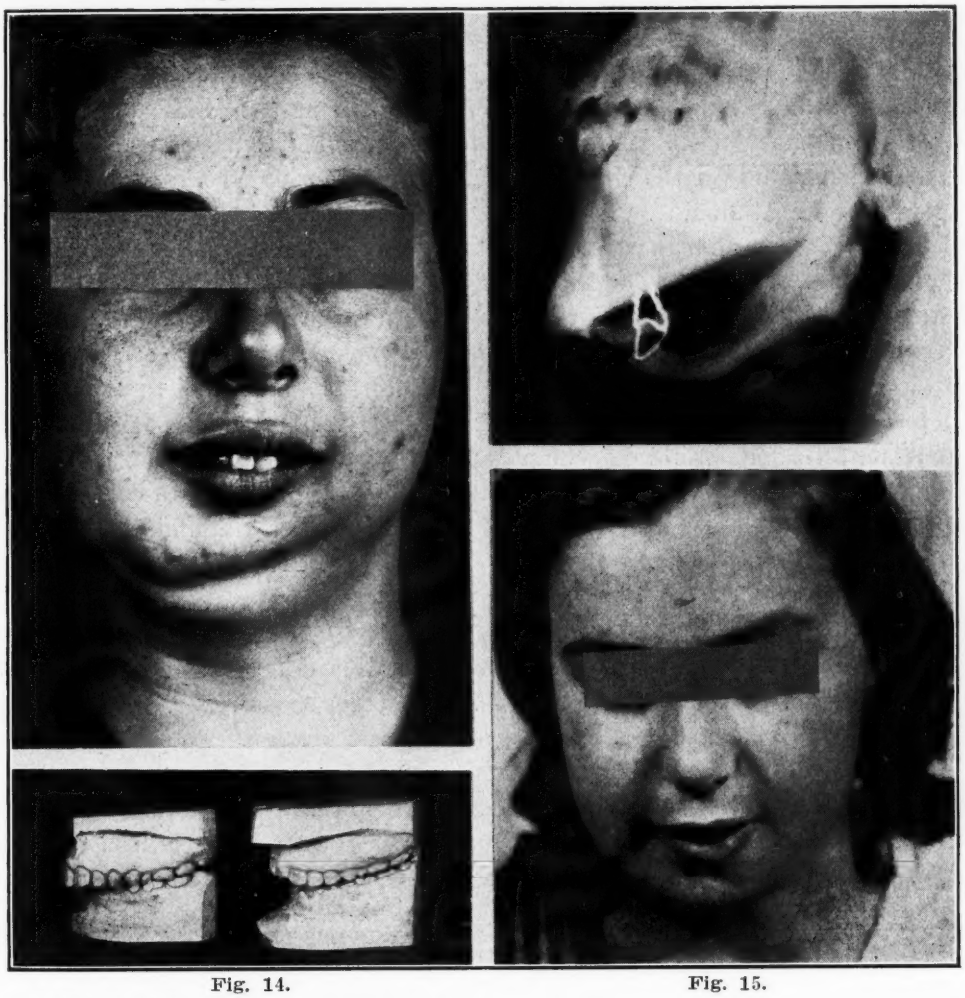

Fig. 14. Fig. 15.

Fig. 12.—Preoperative photograph, Case 4.

Fig. 13.—X-ray picture showing the new position of right side of mandible after making diagonal cut through the bone.

Fig. 14.—Models showing occlusion of the teeth before and after operative treatment.

Fig. 15.—Postoperative photograph.

removed from the tibia and inserted into the jaw, each having a contact with the upper and lower ends of the jaw bone. The grafts were held in position with catgut sutures. Pressure bandage was applied. The patient made an uneventful recovery and was discharged from the hospital July 6. He was referred back to the Harvard Dental School for follow-up care. After the transplantation of bone had successfully healed, the splints were removed

and more teeth were extracted. Two dental appliances were then constructed at the school under the direction of Dr. Henry Carney (Figs. 10 and 11).

Case 4. This patient, aged eighteen years, had had extensive osteomyelitis of the mandible ten years before, following an extraction of a tooth. As she grew older, distortion of the face became more marked. Examination on October 18, 1935, showed definite asymmetry of the face with retraction of the chin to the right (Fig. 12). All the mandibular teeth on the right side were missing, and the mandible on the right was definitely sclerosed bone. The maxillary teeth, while well developed, showed a definitely contracted arch laterally. This was undoubtedly due to the distorted position of the left side of the mandible. The patient was operated upon at the Massachusetts Eye and Ear Infirmary on November 2 under avertin and ether anesthesia. An incision was made over the right alveolar ridge extending from the retromolar region to the median line. The buccal side of the mandible was exposed by reflecting back the mucoperiosteum with an elevator. With a surgical bur a diagonal cut was made through the body of the mandible extending from the right third molar region obliquely downward to the cuspid region. Drill holes were made at opposite ends of bone and the ends fastened together with wire in the new position (Fig. 13). This brought the mandible to an extreme left position as seen by the models in Fig. 14. I was told by the orthodontic department that it would be comparatively easy to expand the contracted maxillary arch in order to allow the maxillary teeth to come into contact with the mandibular teeth on the left side. The patient is still under treatment, and there is already a marked improvement of the facial contour (Fig. 15).

### BILATERAL RETRUSION OF THE MANDIBLE

The third type of deformity is the extreme bilateral retrusion of the mandible. This type is comparatively rare. These cases, however, present some interesting problems and are quite varied in their picture. They may be congenital in origin, but the majority are due to trauma or infection in early childhood. A number of them are associated with bilateral ankylosis of the temporomandibular joint. As these cases have been few in number in my experience, I hesitate to describe them under a definite classification. I will, however, discuss three cases, each one presenting a different problem.

Case 5. This patient gave a history of an abscess of the right side of the mandible at the age of thirteen months, followed by necrosis of the bone, the treatment of which required two or three operations. As she grew older, the jaw failed to develop, and there was limitation of the movements of the jaw which gradually became more marked until she developed complete ankylosis and marked underdevelopment of the mandible. Therefore, it had been necessary to remove the two mandibular central incisors in order to feed the child. My examination on April 23, 1930, showed complete ankylosis probably involving the right temporomandibular joint. The teeth were in a badly decayed condition. There was a marked underdevelopment of the mandible and retraction of the chin (Fig. 16). Measurements showed the right side of the mandible much shorter than the left. An arthroplasty was performed at

the Massachusetts Eye and Ear Infirmary on May 31 under ether anesthesia. First, an incision two inches long was made in front of the ear, using the zygoma as the center. The superficial vessels were carefully separated and tied until the zygomatic arch was located. With a blunt periosteal elevator the bone was separated from the soft tissue until the temporal region was exposed. With Kerison forceps and chisels a section of bone was removed from just below the temporomaxillary region. A fascia lata transplant taken from the right thigh was placed between the two surfaces of bone. The exostosis of the temporomandibular joint was very thick, measuring approxi-

Fig. 16.

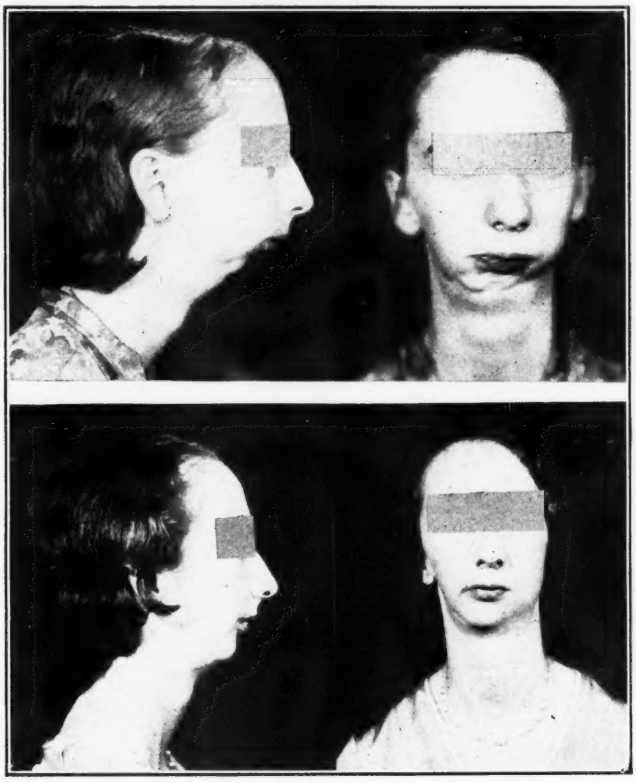

Fig. 17.

Fig. 16.—Preoperative photographs of patient, Case 5.
Fig. 17.—Postoperative photographs of patient.

mately one inch in diameter. The patient took ether rather poorly at the beginning, and it was necessary to introduce a tube through the nose to the trachea and to extract two teeth in order to be able to pull the tongue forward.

Following the operation the patient made an uneventful recovery, and she was able to open the jaws satisfactorily.

The next step in the treatment of this case was to improve the external appearance of the patient. The first operation toward this end was performed on May 29, 1931, under ether anesthesia administered rectally. It consisted of elongating the right side of the mandible. Previous to the operation, however, dental splints were made and cemented over the maxillary and man-

dibular teeth. The right mandibular third molar—under local anesthesia—was freely exposed for the purpose of utilizing it later on for the retention of the splint.

Incision was made over the right alveolar process beginning from the third molar down to the cuspid region of the mandible (the intervening teeth had been lost). The buccal side of the mandible was freely exposed, and with a surgical bur a diagonal cut was made through the mandible beginning from the third molar and extending gradually downward and forward to the symphysis. Holes were drilled through the end of each fragment, and the two parts were separated as far forward as possible and then wired together. External drainage was established through a buttonhole incision in the floor of the mouth. The patient made an uneventful recovery. There was con-

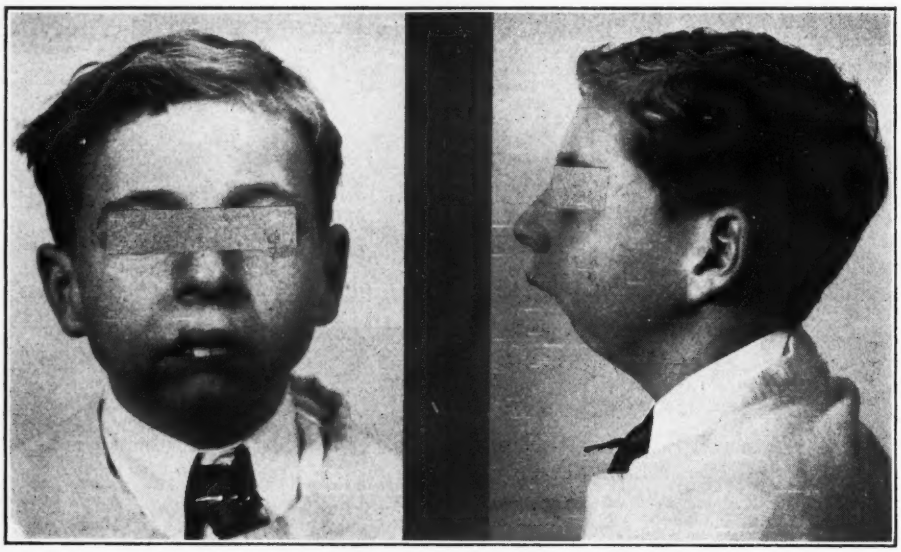

Fig. 18.—Preoperative photographs of patient, Case 6.

siderable improvement in the prominence of the chin, but not enough to be satisfactory. A third operation was performed on September 12, in which an osteoperiosteal graft taken from the tibia was inserted in front of the symphysis through a small opening on the side of the face. This operation added further prominence to the chin (Fig. 17). As the patient had lost a good many teeth, her dental condition was improved by the construction of artificial dentures.

Case 6.—This patient (Fig. 18), a boy twelve years of age, showed a retruded underdeveloped mandible. He gave a rather interesting history. At the age of one year he fell down three steps, hitting his spine. Shortly after this it was noticed that his legs were swelling and were painful; later other joints swelled, and he was unable to walk. He was referred to the hospital for treatment; later he returned home where he remained for the next five to six years. During this time he was never able to walk but got about on his tricycle and "walker." He did not go to school but his mother taught him at home. Four years ago he was sent to the Shriner's Hospital in Spring-

field, Massachusetts, where he remained for six months. While there his legs were straightened, and he was able to walk a little on crutches. Following this he was sent to a Boy Scout camp and later to the Peabody Home where a diagnosis of Still's disease was made. Here, also, considerable improvement was made in the treatment of his "arthritis," and he was able to walk better. On his admission to the Massachusetts General Hospital on January 22, 1935, he was free from pain, was able to get about fairly well on crutches, and had full use of his hands and arms. As he had a cold, however, he was sent home until April.

Examination showed extreme bilateral retrusion of the mandible. There was no definite pathologic condition at the temporomandibular joint, and the movements of the mandible were normal. His general physical examination was negative except for the deformity of the jaws and inability to use his legs without support of crutches. He had, however, the full use of his hands and arms. An operation for bilateral elongation of the mandible was advised.

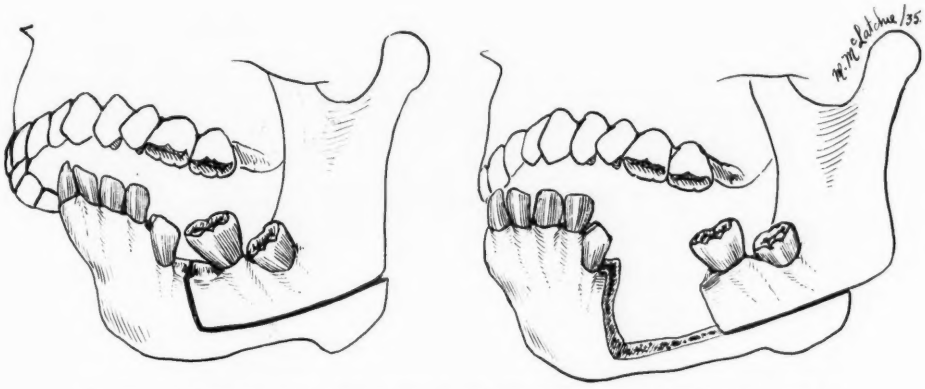

Fig. 19.—Diagram showing method of elongating the mandible, Case 6.

On April 5, under avertin and intratracheal ether, the operation was performed. An incision was made under the border of the mandible about 4 cm. long. With dental burs an L-shaped incision was made beginning at 5 mm. above the lower border of the angle horizontally forward to the bicuspid region where the incision was carried vertically to the alveolar ridge (Fig. 19). The same procedure was carried out on the opposite side until the anterior part of the mandible was perfectly loose. The mandible was brought forward as far as the occlusion of the mandibular teeth would allow and held in position with dental splints fastened to the mandibular second molars, cuspids, and bicuspids. This was supplemented by wiring the maxilla and the mandible together for a few days, for which the anterior teeth were used (Fig. 20). The patient made a good recovery. The wound on the left side healed readily, but the one on the right developed a local infection which was the result of my accidentally cutting the mesial root of the first molar during the operation. The jaws healed soon after the removal of the tooth. Eventually the consolidation of the bone was complete with definite improvement of the occlusion as well as the appearance of the face. In this instance also, however, there was definite underdevelopment of the symphysis. In order to

improve the prominence of the chin, the boy was again operated upon in June, when a piece of rib cartilage was inserted in front of the symphysis through an opening on the right side (Fig. 21).

*Remarks.*—If conditions are favorable, a great deal more can be done for this patient with judicious orthodontic treatment, as he has a definitely contracted maxillary arch.

Fig. 20.

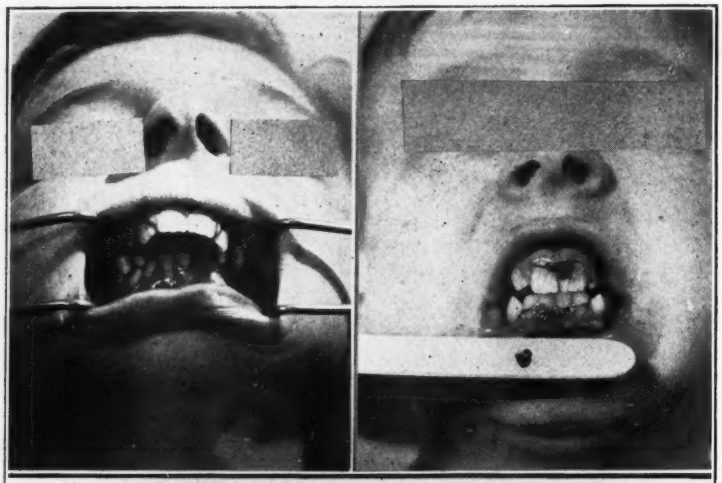

Fig. 21.

Fig. 20.—Photographs showing occlusion before and after operation, Case 6.
Fig. 21.—Photograph showing result of cartilage transplant, Case 6.

CASE 7.—This boy (Fig. 22), aged fourteen years, came under the supervision of Dr. Blumenthal at the Harvard Dental School. He was an intelligent boy suffering from congenital microtia, right and left, and deformity of the chin. The patient's early history is rather confusing. The parents attribute his condition to birth injury, but the deformity of the ears is defi-

nitely congenital, and there is every reason to believe the underdevelopment of the chin is also congenital. Examination of the teeth was interesting as the patient had retroclusion with excessive fullness of the maxillary alveolar arch and a separation of the anterior teeth (Fig. 23). After consultation with Dr. Blumenthal it was decided to follow a rather unorthodox course.

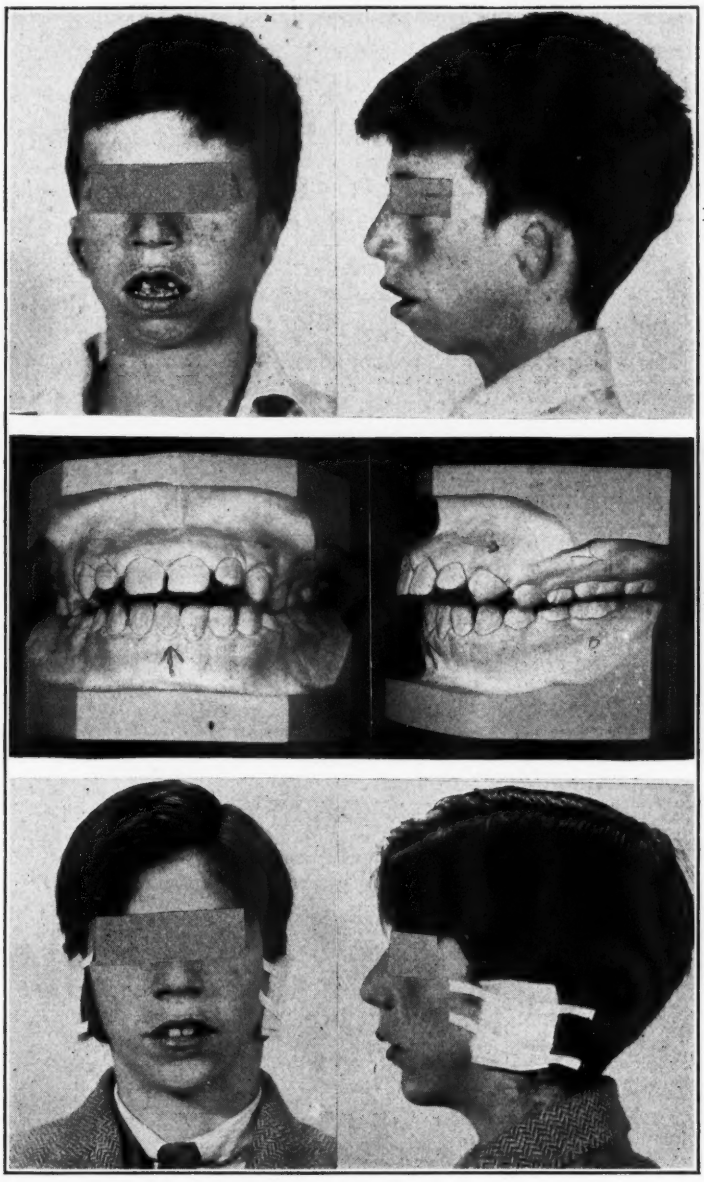

Fig. 22.

Fig. 23.

Fig. 24.

Fig. 22.—Preoperative photographs of patient, Case 7.
Fig. 23.—Models of teeth.
Fig. 24.—Postoperative photographs.

It was considered inadvisable to try to bring the mandible forward because of the shortness of the ramus and body of the mandible. It was also decided not to disturb the existing occlusion of the molars and bicuspids but to remove a maxillary bicuspid on each side and push the maxillary anterior teeth

back with orthodontic appliances. This was considered advisable because of the excessive fullness of the maxillary alveolar arch. While the orthodontic treatment was being carried on, the patient was admitted to the Massachusetts Eye and Ear Infirmary for the surgical treatment of the microtia and the deformity of the chin. I shall omit the details of treatment of the microtia, as that is another story. Two operations were performed for transplantation of rib cartilage to the chin, with rather gratifying results, and I feel quite sure that when the orthodontic treatment is completed, we shall see further improvement in the general appearance of the patient (Fig. 24).

### SECONDARY DEFORMITIES IN CLEFT PALATE PATIENTS

The study of the patients of this type presents some very interesting problems. A baby born with a complete cleft palate and harelip undergoes various operations for the repair of the palate and lip but, in spite of the fact that cleft palate technic is fairly well standardized and simplified, there is always a certain percentage of failures. The failure of the operation combined with the peculiarities of the development of various structures of the face often creates certain types of deformities. The principal ones may be cited as follows: (1) Underdevelopment of the maxillary arch with retrusion of a varying degree. This naturally reflects on the contour of the upper lip which also becomes retracted while the lower lip often becomes hypertrophied in order to compensate for the deficiency of the upper. (2) In addition to the underdevelopment of the maxilla the maxillary halves may overlap anteriorly, thus causing a disturbance of the occlusion of the anterior teeth. (3) Various degrees of irregularities and delayed eruption of the permanent teeth are not uncommon results. This is especially true of the anterior teeth. (4) It is not unusual to find the contour of the nose distorted.

The treatment of these secondary deformities occurring in cleft palate patients may be surgical, prosthetic, or orthodontic. In a given case the combination of all three specialties is often necessary in order to obtain a satisfactory result. It is not an exaggeration to say that almost every child born with a complete cleft palate and harelip should receive orthodontic treatment, since irregularities of the teeth are almost certain to develop.

Formerly the surgeon was satisfied if the child presented good operative results. The literature on this subject mainly discusses various operative methods and gives pictures of the child before and after operation. Very little was written on the subsequent developmental changes in the patients. Now we are not satisfied with the immediate operative result alone. It is the surgeon's duty to keep the patient under constant observation until adult age. Speech defects are quite common and require training; nasal deformities and deviated septums may develop. But what concerns the dentist mostly are the irregularities of the teeth and the distortion of the maxillary arches due to underdevelopment of the maxilla. The external deformity in such cases is obvious, and as soon as the child's permanent teeth begin to erupt, steps must usually be taken for the regulation of the teeth.

I want to call to the attention of orthodontists one important point in the treatment of cleft palate deformities. Many children, particularly those

who have been submitted to multiple operations, exhibit particular types of deformities as they grow older, mainly due to the underdevelopment of the maxillary bones and palate. On the other hand, children who have not been operated upon show normal development of the maxilla although the cleft is present. Minor irregularities of the teeth, especially the anterior ones, occur, but still these do not show the same retracted and distorted picture of the upper half of the face that some operated ones do.

This is possibly attributable to early operative trauma combined with the presence of scar tissue affecting the blood supply of the growing bone, and the orthodontist's interest in the supervision of growth and development makes this condition of particular concern to him.

On the whole, the orthodontist has many difficult problems in the treatment of cleft palate patients. The mouths of these patients have peculiarities which are difficult to bring under accepted classification. They may have congenitally absent teeth; the roots of the erupted posterior teeth may not be well developed; and the majority of patients have delayed dentitions which in adults show gross displacement of teeth with narrow and overlapping arches. These conditions, combined with scar tissues of the lip and palate, make the correction of the occlusion a real problem.

It seems to me that an orthodontist should approach the problem of cleft palate patients from a different angle than is customary for normal children. In a paper read before the Eastern Association of Graduates of the Angle School of Orthodontia in 1928, I made substantially the following remarks.

In my observation of orthodontists handling cleft palate patients, I have noticed one or two points which I should like to mention. First of all, the habit of thinking in terms of individual tooth movement leads them sometimes to make errors in diagnosis and to treat cases without due regard to other related deformities, such as seen in the lip and nose. For instance, a certain number of patients have V-shaped arches, and on close examination one finds that there is an overlapping of the halves of the maxillary bones. To my mind, the proper way to start such cases is to use appliances that will tend to separate the halves bodily. This may cause a gap between the alveolar processes, and perhaps lead to nasal perforation if they are not properly operated upon. As these conditions are easily repaired by surgery, however, they should not be a cause for worry. The important point is the proper alignment of the alveolar processes and a reasonably satisfactory occlusion of the maxillary and mandibular teeth, especially the posterior ones.

In treating older children and adults who exhibit a pronounced underdevelopment of the maxilla combined with an apparent overdevelopment of the mandible, we can select two courses. First, all efforts should be made to regulate the occlusion in the molar and bicuspid region; then the anterior teeth should be extracted and replaced by a prosthetic restoration that will not only supply the missing teeth but also restore the contour of the upper lip. Second, when circumstances are very unfavorable for successful orthodontic regulation, our only course is to extract the anterior teeth and to adapt the restoration to the remaining misplaced teeth. In treating such patients

we often find it necessary to operate and prepare the mouth and lip to receive an appliance bulky enough to produce the proper contour of the upper lip.

We find, however, that the usefulness of orthodontic treatment for the improvement of function and the appearance of cleft palate patients is limited.

Fig. 25.

Fig. 26.

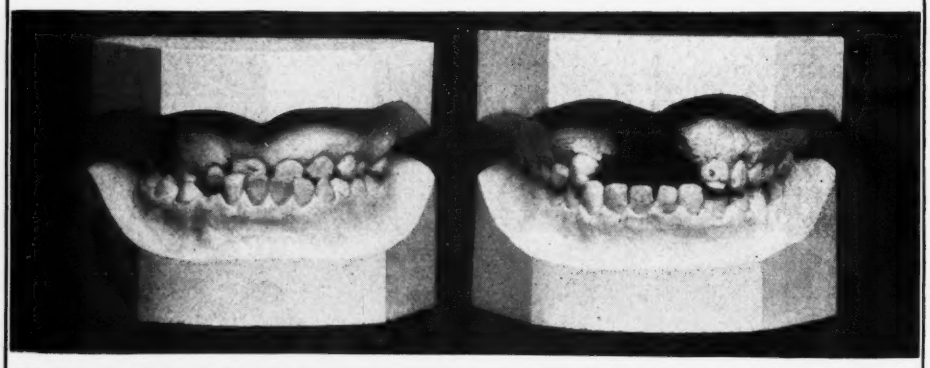

Fig. 27.

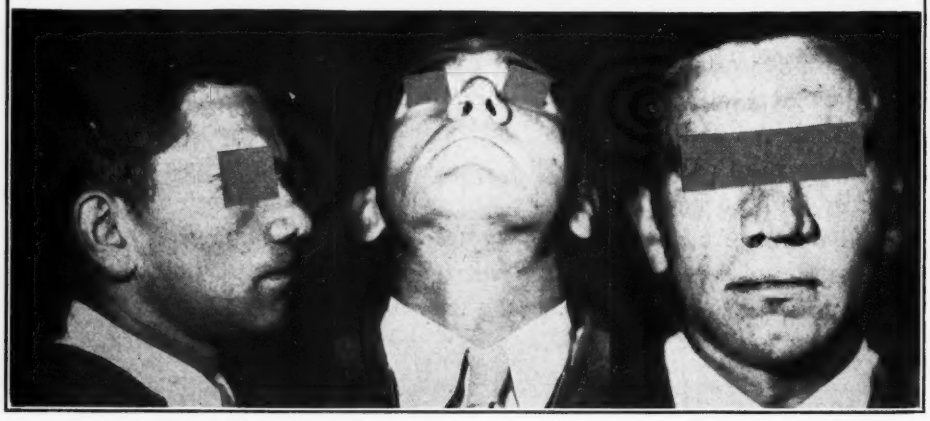

Fig. 25.—Preoperative photographs of patient, Case 8.

Fig. 26.—Models of the teeth before and after orthodontic treatment. (Courtesy of Dr. Margolis.)

Fig. 27.—Postoperative photographs of patient.

Many cases require secondary operations combined with prosthetic appliances to make them as efficient and presentable as possible. As a result, plastic surgery for the repair of lip, nose, and palatal defects, combined with orthodontic treatment, becomes indispensable.

The treatment of the various types of deformities mentioned above requires considerable study and planning. First of all, it is important to make a correct diagnosis of the primary factor causing the deformity. Not infrequently, secondary changes in the contour of the face or the occlusion of the teeth may mislead us and make it difficult for us to determine the primary cause. Second, the course of treatment must be determined in advance in as minute detail as possible because these cases present complex problems. Third, it is often necessary to consult several specialists before intelligent planning can be determined.

Case 8.—I first saw this patient when he was ten years of age. He was born with a complete cleft palate and harelip. He had been successfully operated upon. My first examination when the patient was ten years old showed the upper lip considerably retracted, the right nostril was badly distorted and the teeth were quite irregular. The soft palate was short, and there were one or two perforations of the hard palate and under the lip. His speech was distinctly nasal.

The general plan of treatment outlined was as follows: first, to regulate the teeth, especially the bicuspids and molars; second, to extract the maxillary central and lateral incisors and to construct a partial denture which would give enough fullness to establish a normal contour of the lip; and third, to operate for repair of the upper lip, nose, and palate.

I saw the patient again on June 30, 1931 (Fig. 25). My examination showed the maxillary arch well expanded by Dr. Margolis, who had undertaken the orthodontic treatment of bicuspids and molars, the teeth in good occlusal position, but the x-ray examination showed the anterior teeth either misplaced or nonerupted. The four anterior teeth were removed (Fig. 26).

The operative treatment was started May 6, 1932, at the Massachusetts Eye and Ear Infirmary. In this operation the nose and upper lip were repaired. The second operation, September 5, consisted of repair of the palatal perforations, elongation of the soft palate, and further repair of the right nostril (Fig. 27).

Case 9.—This patient (Fig. 28), aged twenty-three years, was sent to me by Dr. John J. Fitz-Gibbon. He was born with double harelip and cleft palate. The lip defect was repaired when he was a few weeks old, but the cleft of the palate was still present.

My examination showed the young man well developed physically. His speech, however, was distinctly nasal. The tip of the nose was flat and the nostrils were broad. The upper lip was markedly retracted and covered with conspicuous V-shaped scars, while the red border was irregular with a distinct notch in the median line. The premaxillary bone was retracted and small and was not attached to the maxillary arch. The cleft of the palate was fairly wide with the soft palate tissue well developed. There was a marked retrusion of the maxilla with the bite very close when the teeth were in contact. The general outline of treatment was as follows: (1) to operate on the nose, lip and palate; (2) to extract the maxillary incisors; (3) to construct an artificial denture that would supply the incisor teeth, afford bulk anteriorly to improve

the contour of the lip and, in the meantime, raise the bite in order to increase the distance between the tip of the nose and the chin sufficiently to improve the facial outline.

This plan was carried out successfully by a series of operations beginning June 3, 1932. The first operation was performed for the correction of nasal deformity. In the second operation, Feb. 1, 1933, the cleft in the soft palate and part of the hard palate was closed, but no attempt was made to close the area immediately behind the premaxillary bone, as there was not enough tissue to insure success. This was not considered important, however, as an artificial denture would be effective in covering this perforation.

Three minor operations were performed under local anesthesia to secure

Fig. 28.

Fig. 29.

Fig. 28.—Preoperative photographs of patient, Case 9.
Fig. 29.—Postoperative photographs of patient.

further improvement of the nose, lip and palate, the last one being performed on May 11, 1933.

The patient was referred back to Dr. Fitz-Gibbon, who skillfully made an artificial denture which satisfactorily completed the treatment of this case (Fig. 29).

Case 10.—This case is a good example of intelligent cooperation of orthodontia and plastic surgery to correct malocclusion as well as improve the facial outline. The patient, aged twenty-two years, a dental student, had a Class III malocclusion, as seen in Fig. 30. In addition he also had a marked malformation of the nose with a pronounced hump and a long broad tip. The combined effect of the malocclusion and deformity of the nose is seen in Fig.

31. The patient, being extremely sensitive regarding his appearance, consulted Dr. H. I. Margolis, who corrected the dental arch. Later on the patient applied for surgical correction of the nasal deformity at the Massachusetts Eye and Ear Infirmary. I operated upon him on June 2, 1934, and he was discharged from the hospital one week later. The photographs in Fig. 32 were sent to

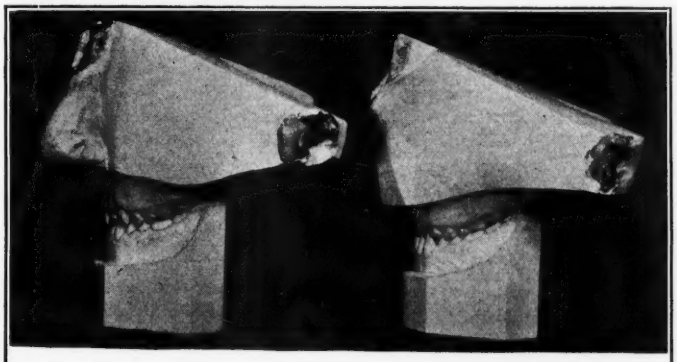

Fig. 30.

Fig. 31.

Fig. 32.

Fig. 30.—Models of teeth before and after orthodontic treatment, Case 10. (Courtesy of Dr. Margolis.)

Fig. 31.—Photographs of patient before and after orthodontic treatment.

Fig. 32.—Photographs of patient showing result of combined orthodontic treatment and plastic surgery.

Dr. Margolis in October, 1935, and show the improvement in the facial outline as compared with the pictures taken previous to orthodontic and operative treatment.

## CONCLUSION

This paper by no means exhausts the subject I have undertaken to discuss, nor was it intended to do so. My purpose has been to draw the orthodontist's attention to the assistance available in the field of plastic surgery for the solution of some of his most difficult and perplexing cases. I realize that these are not encountered in his daily practice, but if he bears in mind what plastic surgery may be able to do in certain types of grossly deformed cases, he will be able to make a definite contribution toward the health and welfare of patients who otherwise might not be helped.

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# ORAL EPIDERMOID CARCINOMA

## General Considerations and Etiologic Factors

Earl C. Padgett, M.D., Kansas City, Mo.

THE aspects of cancer in and about the oral cavity are somewhat protean. To select properly the best treatment at the present time for the individual patient requires a triumvirate of knowledge—namely, of pathology, of radiology, and of surgery. Surgery, irradiation, or both, are our only weapons of attack. Whenever a cure seems probable or possible, the attack must be planned so as to encompass completely the anatomic as well as the pathologic necessities of the given case. When palliative treatment alone is considered possible, the method is selected which will give the patient the longest period of comfort with the least disability. The life history of the tumor is important in this consideration.

During the past two decades, very considerable addition has been made to our knowledge of epidermoid carcinoma of the tongue and oral cavity in general. The use and development of irradiation methods have markedly influenced ways of treatment. Broders' scheme (Fig. 1) of classification of epidermoid carcinoma in particular has served to emphasize the importance of studying the character of the disease as an aid in determining the prognosis. Pathologic studies along with observation of the irradiation response have been combined in recent attempts to recognize histologic criteria for grouping tumors according to their radiosensitivity. In some instances it has been found that the tumor most susceptible to surgical attack is least susceptible to irradiation and vice versa.

The importance of a more careful selection of the weapons for carcinoma destruction has become increasingly evident. The good therapist, therefore, has come to the realization that he must understand the pathology of the lesion, the possibilities that may be offered by surgical attack, the possibilities to be offered by irradiation treatment, and finally the possibilities to be offered by both surgery and irradiation.

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Note.—A series of articles which will appear in continued form proposes to cover the field of malignancies as they are seen about the face, mouth, and jaws. This subject is an extremely important one—especially to the dentist. Since it is impossible to give an adequate discussion of all phases of the subject in an article or two, it has been thought best to take up the subject in a continuous form and to cover it in its entirety. All efforts will be made to stress the various diagnostic features which are always of paramount importance to the man who has to make the original decision as to the type of lesion. Also an attempt will be made to discuss the pathogenesis and the pathology of the tumors of this region, and finally to take up the principles of irradiation and the surgical methods which one has to know in order to be able to treat the disease. An adequate number of illustrations will accompany these articles. An apology is offered for the triteness of the first article which takes up a discussion of some rather fundamental preliminaries which it seems best to cover in a preface, so to speak, to the more detailed regional discussion.

Fig. 1.—*A*, Epidermoid carcinoma showing a rather marked tendency toward adult cellular differentiation, Broders' Group 1; 75 to 100 per cent adult cellular differentiation.

*B*, Epidermoid carcinoma, Broders' Group 2; 50 to 75 per cent adult cellular differentiation.

*C*, Epidermoid carcinoma, Broders' Group 3; 25 to 50 per cent adult cellular differentiation.

*D*, Epidermoid carcinoma, Broders' Group 4; 0 to 25 per cent adult cellular differentiation.

The pathologist and the surgeon have thus been given a new responsibility. By a study of the microscopic appearance and the clinical course, often the character of the tumor and its probable response to the various types of therapy can be to a certain extent foretold. The plan of treatment must often be altered in accordance with the clinical course, the stage of development, and the irradiation response of the lesion. (Fig. 2.)

Contrary to a somewhat general skepticism, epidermoid carcinoma in and about the face, mouth, and jaws has a relatively good prognosis when due consideration is given all phases of the picture, and when sound methods of attack are adequately employed. Good end-results of treatment of carcinoma in this region depend upon the complete eradication of all malignant cells within and about the local lesion and its tributary lymphatics. Fortunately, in the more adult squamous cell epitheliomas, the collarlike arrangement of lymphatics about the neck serves as a barrier which usually prevents metastasis below the clavicle. In balancing the factors for and against a given

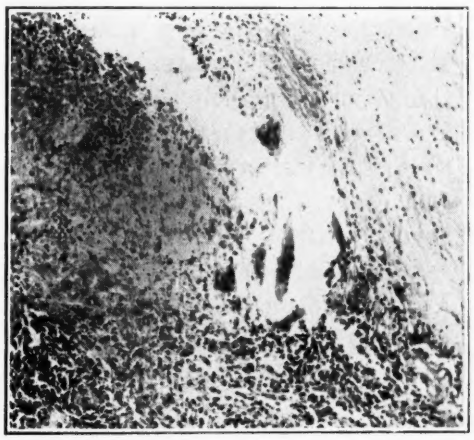


Fig. 2.—Epidermoid carcinoma. Biopsy removed six weeks after radium application. The ulcerating lesion had healed. Shows some round cell infiltration, a moderate amount of hyalinization, and there is some evidence in the field of a few injured but possibly viable squamous carcinoma cells.

method, the same rules will not hold for both the local lesion and the embolically filled tributary lymphatics. Irradiation does not affect metastatic squamous cell carcinomas in the lymph nodes as favorably as it affects the local lesion. As a matter of fact, there is evidence that irradiation very rarely if ever cures adult metastatic squamous cell carcinomas when located in the lymph nodes. Moreover, regarding the treatment of local lesions, it should be mentioned that, when bone is involved, irradiation methods usually do not effect a cure unless bone necrosis is produced. Consequently, as a rule, an excision or a destructive procedure becomes the method of choice.

*Irritants to the Oral Mucosa.*—Those conditions which produce a chronic inflammatory reaction or cause a chronic inflammatory reaction to continue, practically all are associated with some increase in the incidence of cancer in the oral region. But a considerable amount of proof has now accumulated that conditions which will cause a malignant degeneration in one individual do not necessarily produce it in another. In other words, not only the irrita-

tive factor is important but also the susceptibility of the individual plays a part. As we have no yardstick for measuring either, a discussion of the exact position of the factors must necessarily be somewhat indefinite. In some instances not only the susceptibility factor but several irritative factors apparently contribute their part in the development of a malignant lesion.

*Inclement Weather.*—On the face and the lip even inclement weather has a detrimental effect in many individuals. Cancer of the skin of the face is undoubtedly slightly more common in those leading an active outdoor life. One may mention the tendency of railroad firemen and engineers to show a higher incidence of cancer of the skin of the face. Some keratotic lesion generally precedes for a considerable period of time the appearance of an actual malignant degeneration. Besides the wind, the sunshine may tend to irritate the skin. Farmers seem to show an increased incidence of cancer of the lip. Their lips are often cracked and irritated by the rigorous outdoor life. New mentions the increased incidence of epithelioma of the lip in farmers when discussing the Mayo series.

*Tobacco.*—Tobacco also has some definite influence in the development of lip and oral cancer. It stimulates the epithelium, produces a chronic hyperemia, local erosions, edema, and lymphocytic infiltrations. In smoking, heat effects may be added. This is especially true in pipe smokers. Tobacco chewers are somewhat more prone to develop cancer where the quid is held against the cheek. Tobacco to a lesser extent affects the posterior tongue, the palate, tonsils, pharynx; and the effects of excessive amounts of tobacco smoke on the larynx have long been emphasized.

Statistics in regard to the part that tobacco plays in producing cancer of the oral mucosa must necessarily be rather indefinite. Tobacco is rather commonly used in lesser or greater amounts. The quantity used is probably an important factor in the development of malignant degeneration. Moreover, individuals who have never used tobacco also develop malignant changes probably due to the factor of susceptibility plus the various irritative factors.

*Alcohol.*—Alcohol has been suggested as a factor. The fact that cancer of the mouth is eight times more frequent in men than in women contributed in the past to the idea that alcohol was of some importance. At present, however, it is thought that the effect of alcohol is ordinarily too temporary to be a factor of importance in increasing the incidence of buccal cancer.

*Bacterial Irritation.*—No one can fail to be impressed with the uncleanliness of the teeth in the average patient suffering from cancer of the buccal cavity. There is probably some relationship. Even normally the anterior half of the tongue is covered with papillae to which cling myriads of bacteria. Whether the uncleanliness of the mouth somewhat characteristic of the patient with oral cancer is one of cause or of effect is difficult to say. Inflammatory conditions of the gums, such as pyorrhea, may eventually have an indirect relationship to mouth cancer on the basis of being a long-continued irritant. In some individuals the evident mouth infection is probably secondary. Any prolonged chronic irritation possibly increases the incidence of oral cancer in such individuals.

Tartar accumulation may over a long period of time promote a low grade inflammation of the gums. Carious, jagged teeth or poorly built dental appliances almost constantly rub and irritate various parts of the oral mucosa. Chronically inflamed tissue and ulcerations are thus developed which may ultimately undergo malignant degeneration in the susceptible.

*Luetic Scars.*—The scars of an old syphilitic infection—especially on the tongue—have been blamed for a certain percentage of epithelioma of this region. Fraser places the incidence of syphilis in cases of carcinoma of the tongue as a whole at 42.3 per cent and in carcinomas of the dorsum of the tongue at 78.3 per cent. In various series of malignancy of the mouth the percentage has been estimated from 4 to 90 per cent as having been preceded by luetic scars on the mouth (Meller 3.5 per cent, Fournier 92 per cent). Although undoubtedly the latter percentage is too high, Fraser states that syphilis often precedes leucoplakia and that 90 per cent of carcinoma of the dorsum is preceded by leucoplakia. This figure again is undoubtedly exaggerated. Most observers have found that in somewhat less than one third of oral cancer some evidence of leucoplakia is demonstrable. About 20 per cent of all leucoplakic lesions of the mouth in the series studied by Lund showed evidence of lues. When the patients without a Wassermann test were excluded, the percentage was 30 per cent. Lund found in 1,540 cases studied that the relationship of cancer to syphilis varies greatly according to location. In all locations except the tongue and cheek, the presence of a positive history of syphilis or positive Wassermann test is so low that the incidence may be assumed to be close to the normal incidence in the population, considering the average age and social status of patients having cancer of the mouth. The relationship of syphilis to cancer is much more important in the tongue, falling somewhere between 17 and 32 per cent (Lund).

Another interesting feature of Lund's study is that the pathologic index or grading of the cancers of the tongue developing in syphilitic lesions indicates a higher degree of malignancy than was noted in nonsyphilitic cases. No conclusions could be reached for other locations.

*Probability of an Ulcerous Lesion of the Mouth Being Due to Syphilis in Those of Cancer Age.*—Of interest to the frequency of syphilis alone, when an ulcer in the mouth is found in an elderly individual and the question of diagnosis arises, are the observations of Lund from the Colles P. Huntington Hospital and the Massachusetts General Hospital. In 1,548 cases with ulcerous lesions of the mouth seen in a cancer clinic, only 9 were found in which the single diagnosis of syphilis of the mouth was made (Lund). These did not include leucoplakia. The locations were: tongue 4, tonsil 2, palate 2, and lip 1. The types of lesions were ulcerative gumma 6, gumma 1, multiple ulcers and fissures 1, glossitis 1. The sex incidence was male 6 and female 3.

*Leucoplakia.*—The importance of leucoplakia as a precursor of malignant degeneration of the oral mucosa seems definitely established in all series of patients. (Fig. 3.)

Fournier and von Bergmann originally estimated that leucoplakia preceded in about 30 per cent of cancer of the buccal cavity. No evidence has been

presented to this day that would lead one to believe that these observers underestimated the importance of leucoplakia as a precursor of oral cancer. All leucoplakias should be destroyed if their diffuseness does not contraindicate such a radical procedure. In the latter case certainly careful and prolonged observation should be insisted upon, as the slightest tendency to ulceration usually means a malignant change.

*Papillomas.*—Papillomatous projections of the oral mucosa—especially if subjected to trauma or prolonged irritation—for one reason or another undoubtedly contribute to a certain share of buccal epithelioma. (Fig. 4.) Butlin

Fig. 3.—(High magnification.) Leucoplakia of the mouth showing the increased thickness of the epithelial layer. The epithelial cells show no tendency to infiltration.

states that all papillomas of the mouth should be removed without procrastination because of their tendency to undergo malignant change. An indolent crack near the base of such a lesion is especially likely to be an early malignant change.

*Summary of Importance of Irritative Factors.*—It can truthfully be said that in the neighborhood of 75 per cent of epidermoid carcinoma of the buccal cavity is preceded by some one of these precancerous factors, and conceivably if it were possible to eliminate adequately all such influences or destroy all such early lesions, the incidence of epithelioma of the oral cavity would be reduced very materially.

*Precancerous Lesions.*—Before discussing the fully developed malignant lesions of the oral cavity, it is well to say a word concerning the various precancerous lesions.

As the mouth cavity is examined commonly by both physician and dentist, each should be schooled in the recognition of the so-called precancerous lesions, first, because the dividing line between the precancerous and the early cancerous lesions is not always distinct clinically and, second, it is well established that epidermoid cancer often develops in unhealthy or abnormal epithelium. Certainly both avoidable procrastination and uninformed advice and treatment do much to keep cancer of the tongue and oral cavity a most dreadful and fatal disease.

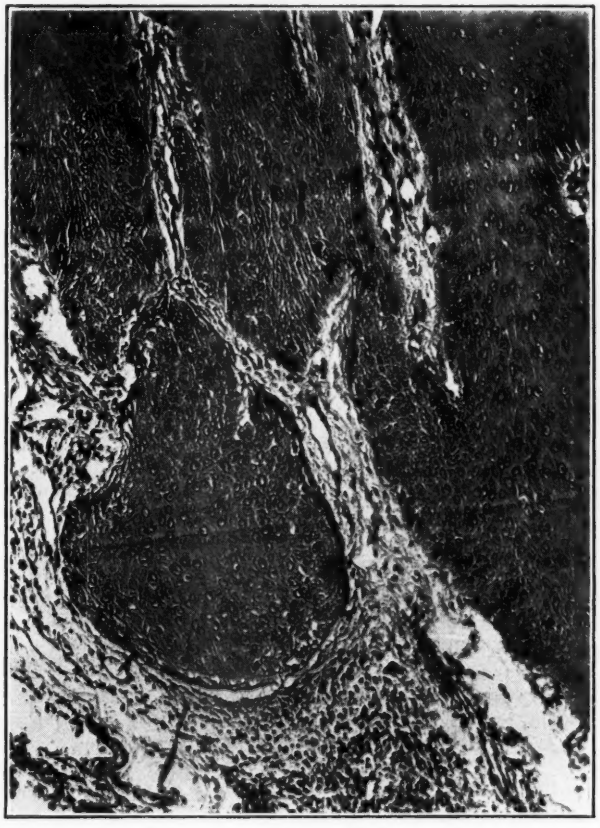


Fig. 4.—Section of a warty papilloma of the mouth. No absolute evidence of infiltration is seen.

One cannot overemphasize the importance of localized thickenings, indolent cracks, papillary structures, as well as chronic ulcers, irritative appliances, and generally unclean teeth.

*Importance of Biopsy.*—When in doubt of the diagnosis, excision followed by microscopic examination is a reliable procedure that must be insisted upon. When the lesion is evidently precancerous, the irritative factor should be eliminated especially in those individuals of the cancer age, and periodic observation should be advised. When the lesion is an early malignant degeneration, a great service has been done for the patient, for in such cases proper treatment offers a good chance of a permanent cure.

*Importance of Early Diagnosis.*—The importance of early diagnosis of buccal malignancies cannot be too definitely stressed. When one considers, on the one hand, the improbability of successful treatment in the late stages, the suffering of the victim, and the invariable outcome when treatment is unsuccessful, and, on the other hand, the long periods of no visible evidence or perhaps even the lasting obliteration of the disease that may follow proper treatment at an early date, the importance of early diagnosis and early treatment cannot be overestimated. Nowhere else, save on the skin, can precancerous or early cancerous lesions be so easily observed. Dentists especially may contribute to the reduction of cancer of the mouth, as most persons in this country of cancer age frequently consult their dentists. At that time their teeth are disintegrating or artificial bridges and teeth are being fitted.

*Warning Against the Use of Local Irritants.*—A point worth mentioning is the evil effects of the use of irritants upon cancerous growths. One of the most pernicious and prevalent is the use of silver nitrate or such applications. Many histories state that after such treatment rather indolent carcinomatous growths have been stimulated into more virulent activity. The questionable lesion should never be stimulated to a greater activity by the application of an irritant insufficient to destroy.

*Incidence of Intraoral Cancer.*—In 1929 (last available census), in the United States, about 120,000 persons died of cancer, of which about 4,000 died from intraoral cancer. Thus, it would appear that about 3 per cent of all cancer occurs in the intraoral region.

*Incidence as to Site.*—In 2,741 cases of intraoral cancer quoted by Quick in 1928 and seen at the Memorial Hospital, the following numbers as to site are of interest:

| | |
|---|---|
| Lip | 555 |
| Tongue | 473 |
| Floor mouth | 281 |
| Mucosa of cheek | 185 |
| Superior maxilla | 122 |
| Antrum | 103 |
| Inferior maxilla | 149 |
| Tonsil | 318 |
| Hard and soft palate | 106 |
| Pharynx | 63 |
| Intensive larynx | 165 |
| Extensive larynx and epiglottis | 221 |

Fraser presented a diagram to illustrate the incidence as to site (Fig. 5).

Roughly it may be stated that of all buccal cancer proper, about 43 per cent appear on or in the region of the anterior two-thirds of the tongue, 20 per cent in the palatoglossal regions, 11 per cent in the gingivoglossal sulcus, and 10 per cent in the floor of the mouth.

*Sex Incidence in Intraoral Cancer.*—Burnam in 165 cases had 128 of the male sex and 37 of the female sex. Piquantin (Ewing) estimated 17 per cent of intraoral cancer occurs in women. Roughly about 85 per cent of intraoral cancer appears in the male sex.

*Age Incidence.*—It is well known that epithelioma of the intraoral region is most common between the ages of forty and sixty years with the maximum number falling in the fifth decade. The maximum incidence per given number falls between the seventy-fifth and the eighty-fifth years. After the sixth decade the number of cases decreases on account of the progressive decrease in the number of individuals who are living after sixty years of age. The incidence on a percentage basis of those living, however, increases.

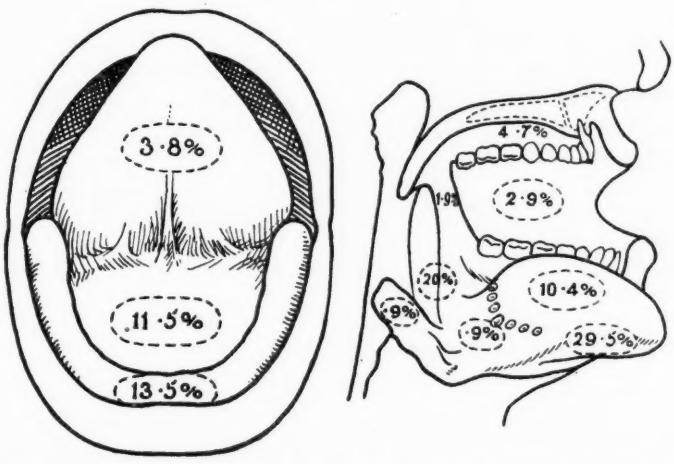
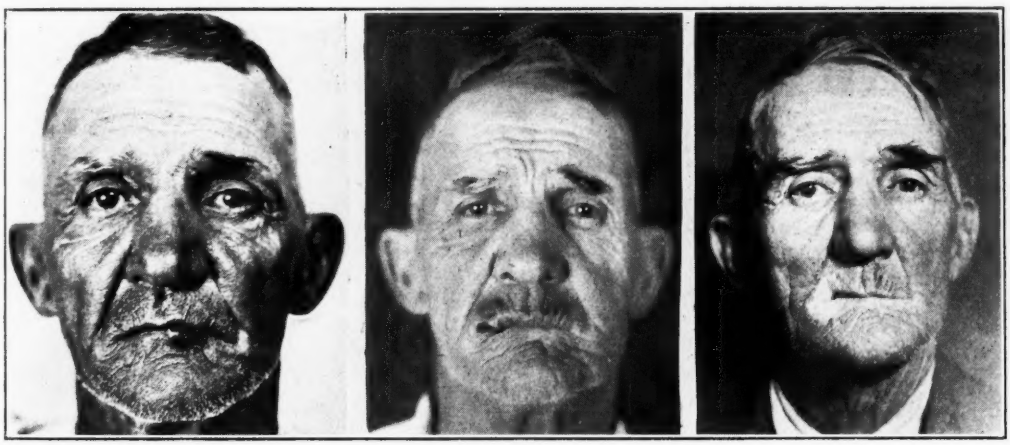



Fig. 5.—Diagram showing the incidence of carcinoma in the mouth in the various locations. (After Fraser.)



*A.* *B.* *C.*

Fig. 6.—*A*, Original squamous cell carcinoma of the lip on the left side.

*B*, Squamous cell carcinoma on the left side was excised by a V-shaped excision, and the scar is shown in the photograph. He remained healed for two years, after which a second carcinoma developed in the corner of the mouth on the right side. It was mostly in the upper lip. The question arises in this case, however, whether this was a second carcinoma or whether it was a recurrence through the circle of lymphatics around the mouth. The microscopic pictures of the two lesions, however, were somewhat different; and, since the second lesion seemed to be mostly on the uppr lip, it was considered to be a second carcinoma developing in the same individual.

*C*, Photograph of patient three months after interstitial irradiation of the second carcinoma.

*Malignant Neoplasms in the Young.*—In 301 malignant neoplasms of the oral cavity, Friedman and Rubenfeld (Bellevue Hospital) found 9 patients between the ages of one and twenty years. Three were spindle cell sarcomas

involving the floor of the mouth, cheek, and soft palate respectively. One was a lymphosarcoma of the antrum; 3 were epitheliomas of the nasopharynx and 2 of the tonsil. Of 16,565 malignant lesions seen at Memorial Hospital, Pack and LeFevre found 37 instances of malignant lesions in the upper respiratory passages in patients between the ages of seven and twenty years. In 6,670 autopsies at Johns Hopkins Hospital, Pearl and Bacon found 49 malignant tumors in children. Helmholz found 56 in the intraoral region, and 4 of these were squamous cell carcinomas.

*Second Buccal Cancer.*—In regard to the incidence of a second buccal cancer in the same patient, Lund found in a series of 1,548 cases of buccal cancer that it is indicated that the development of a second carcinoma of the mouth is about 15 times as common as it would be if chance were the only factor (Fig. 6). He also found that the development of cancer in some other organ is about twice as common as it is in the population of the same age and sex.

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# Department of Orthodontic Abstracts and Reviews

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**Clinical Diagnosis of Diseases of the Mouth.** By Dr. Louis V. Hayes, Brooklyn, 1935, Dental Items of Interest Publishing Co.

In an approach to the main subject the author discusses the place and the scope of oral diagnosis in modern dentistry. "Diagnosis of diseases of the mouth presents the link between the theoretical and the practical phases of modern, scientific dentistry." Rational treatment rests on correct diagnosis. The oral clinician must discard the notion of merely treating teeth. His duty is to examine the mouth and the patient. The preliminary step to diagnosis is a careful examination, which should contain the following records: present history; age; face; lips; mucous membrane; tongue; palate; sublingual space; throat; glands; antrums; temporomandibular articulation; mouth hygiene; teeth. Typical symptoms which can be observed on one or more of these locations are clues to the diagnosis. The "History and Examination Record" chart by Alfred J. Asgis is recommended.

The more common diseases of the mouth, like catarrhal stomatitis, diabetic stomatitis, and Vincent's infection, are gathered into one chapter. Their manifestations appear more or less distributed over the whole mouth, though they may occasionally have predilected locations.

Other diseases are grouped according to their typical locations. All the lesions of the gums, for instance, are discussed under one main heading. They are: lead poisoning, mercurial and phosphorous necrosis, scurvy, pregnancy, tumors, lymphatic leucemia, hemophilia, alveolectomy, and others. (The inclusion of diseases like lymphatic leucemia or hemophilia in this group may be questioned; the heading "alveolectomy," which in itself is no lesion, might be changed to "abnormalities requiring alveolectomy.")

The next group contains lip lesions, among them herpes, pemphigus, mucous cysts, and carcinoma. Several skin diseases, which extend to the lips, like lupus erythematosus and erythema multiforme, also find mention. A careful analysis of each of the lesions discussed is systematically maintained throughout the volume; it contains (1) definition, (2) etiology, (3) symptoms, (4) diagnosis, (5) treatment.

The most noticeable of the cheek lesions are measles, Fordyce's disease, lichen planus, and pigmentations of an unknown origin. We also find here again herpes and pemphigus. The abnormal frenum (why classed among

cheek lesions?) is considered to be an abnormally large muscle attachment between the central incisors which is forcing the teeth apart, and surgical removal is considered essential before orthodontic closing of the space. (Muscle fibers, however, are not always found in large frenums, and numerous cases have been reported in which orthodontic closing of the space brought about atrophy of the frenum without recurrence.)

Very numerous are the lesions which appear on the tongue; but because of the definite coloring, differential diagnosis is not difficult. Sprue and purpura appear on the tongue. We further find the black tongue, scrotal tongue, dyspeptic tongue, and geographic tongue or wandering rash. The abnormally small tongue, macroglossus, and the tied tongue are of orthodontic interest, because both conditions prevent normal tongue pressure and functioning (macroglossus, which sometimes causes spacing of the teeth, is not described). Lichen planus and leucoplakia are again encountered. The chronic systemic diseases find their first mentioning in the tubercular lesions of the tongue.

Thrush and diphtheria show their lesions mainly on the palate. A particular growth found in the midline is the torus palatinus, the etiology of which is unknown.

In the next chapter the effort to group the lesions according to locations is abandoned, and the oral manifestations of syphilis are noted in a chronologic manner: congenital syphilis with its Hutchinson's incisors and mulberry molars; lesions of primary syphilis with its characteristic chancre; of secondary syphilis with its mucous patches; and of tertiary syphilis with its gumma. Glandular disturbances are noticed in hypersecretion, aptyalism, infection, and inflammation of the parotid gland. Paget's disease and Hodgkin's disease are glandular disturbances of endocrine nature.

Correlations of lesions of the face lead us into the field of medicodental science. The author makes a clarifying distinction between conditions due to prognathism and those due to acromegaly. "Prognathism should be differentiated from acromegaly. Here the bones around the jaw show their abnormal relationship. In acromegaly we note an enlargement of the bone itself." Lesions like urticaria, emphysema, scleroma, and leprosy are taken up in this connection.

Diseases which are evidenced by facial swellings are grouped together, regardless of what their etiology may be. Therefore, we find described in the same chapter the acute dentoalveolar abscess, the carcinoma, and the infectious foot and mouth disease.

A chapter on neuralgia deals with the different manifestations of facial neuralgic pains, including atypical neuralgia caused by broken needles, cloudy sinuses, roots in the antrum, and impacted teeth. Growths in the oral cavity are divided into benign growths (papilloma, fibroma, angioma, etc.) and malignant growths (carcinoma, sarcoma, and melanoma). The diagnosis of oral fractures is taken up in great detail, as the author feels it presents a neglected phase in his specialty. Their treatment is often delegated to the general surgeon. As a knowledge of mouth diseases is necessary to arrive at the correct diagnosis, "oral fractures present conditions of a nature that rightfully places

them in the domain of diseases of the mouth, face, teeth, and jaw bones." Cysts of the jaws are, for clinical expediency, divided into two types: radicular cysts, or dental root cysts, usually found at the apices of devitalized teeth, and follicular cysts, which contain a normal or an aberrant tooth.

Alfred J. Asgis contributes the closing chapter, which deals with the problem of "*selecting subject matter for instructional purposes.*" It contains probably the most extensive bibliography which has been published with a book of this type, nearly 80 pages of reference material, books and periodical literature, classified according to the subject of each chapter of the book.

The author has presented the subject of clinical diagnosis in a concise and matter-of-fact manner. His descriptions are clear, his explanations to the point. He has the admirable quality of a real teacher to paint pictures with words, a fact which adds a great deal to the usefulness of his writings, especially on a subject like oral diagnosis. The grouping of lesions according to their location, lip, tongue, cheek, etc., makes for simplicity in presentation and for greater ease in differential diagnosis. On the other hand, it makes it necessary that some diseases are discussed in two or three different places, as for instance, leucoplakia, pemphigus, tuberculous lesions. Other complications, which occasionally arise through this grouping, have already been mentioned, and many more could be added. Acromegaly, for instance, is, on account of its location, treated under "face lesions" while it rightly belongs to glandular disturbances. With few exceptions, all diseases are discussed in the form of case reports, which, enhanced by the author's power of description, makes them interesting and instructive to read, though some scientific and systemic background is thereby lost. The dental student may not quite appreciate this form of presentation, but the dental practitioner will; and it is evidently for him that this eminently practical clinical diagnosis was written. The practical aspect of the book is further aided by an abundant amount of illustrations, though some of the excellent photographs seem to have suffered in reproduction (Fig. 72, for instance, and the colored illustrations). The print is large and clear; the covering of the book, strong and attractive.

*E. N.*

# The Forum

Articles for this department should be sent to Dr. William R. Humphrey, 1232 Republic Bldg., Denver, Colo.

Dr. Charles Waldo's observations as a full-time worker in the orthodontic department of the Child Research Council, Colorado School of Medicine, have caused him to question the availability of evidence in support of statements made in an article appearing in the *New York Journal of Dentistry,* entitled "Initiation of Orthodontic Treatment."

Through correspondence I learned that there is a difference of opinion among the members of the Consulting Staff of the *New York Journal,* namely, Dr. Lowrie J. Porter, Dr. Frederick C. Kemple, and Dr. George M. Anderson.

We are publishing the article, together with Dr. Waldo's questions, a letter from Dr. Porter to Dr. Pollock, and Dr. Anderson's answer as sent to the *New York Journal;* also an article by Dr. Kemple in defense of the answer.

We invite a free discussion of this subject in the Forum.

*W. R. H.*

The following question and answer taken from the Consultation Department of the *New York Journal of Dentistry* for January, 1936, contains much that should be of interest to readers of the Forum, and much that invites discussion:

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### "Initiation of Orthodontic Treatment

"Question: What stage in the development of dentition is best suited for initiating orthodontic treatment?

"Answer: The wording of the question is to be commended since it asks at what stage of development, rather than at what age should orthodontic treatment be started. The age of the patient has very little significance, as children of the same age may be at various stages of development, depending upon the general health of the patient, metabolic disturbances and hereditary influences.

"During the first decade of modern orthodontia, the generally accepted dictum as to the proper time to start orthodontic treatment was, 'the earlier the better.' Later, when many young children who were not subject to orthodontic treatment were kept under observation over a period of years, and the development of the dentures studied, it was found that a large per cent of the cases which early presented what appeared to be a serious degree of malocclusion, corrected themselves through natural growth to the point of becoming entirely satisfactory adult dentures, and well within the range of nor-

mality. The chief reason usually advanced for the very early treatment of malocclusion is that it prevents distorted growth of the underlying bone, i.e., the maxillae and mandible. Careful observation and study of these cases to date have failed to adduce any evidence whatever that orthodontic movement of the teeth in any way affects the growth of these underlying bones; or that the bones proper will be in any way affected if the teeth are left in malocclusion. The only parts that are apparently affected by orthodontic tooth-movement, or by malocclusion, are the alveolar processes and the teeth themselves.

"There is no justification for the treatment of malocclusion, of whatever form, in the deciduous dentures. If the malocclusion involves only one or two of the permanent teeth, and these teeth are so locked by the opposing arch as to prevent their assuming a correct position, i.e., if one or two of the upper permanent teeth should erupt inside the lower arch, the condition should be corrected at once. If the malocclusion is general, as in constricted crowded arches, or if the upper and lower arches are in incorrect mesio-distal relation, it is preferable to wait until the deciduous molars are being shed and their permanent successors are erupting, before starting treatment. This stage of the development of dentition is generally best suited for initiating treatment. At this stage dental growth is usually active, and the time required for completing the treatment is shortened."

Consultants: Drs. Lowrie J. Porter, Frederick C. Kemple, George M. Anderson.

In view of the definite though general nature of a number of these statements, it seems fair enough to ask the consultants for more specific information in their support. Where, for instance, and by whom have many children been observed for periods sufficient to cover development from the deciduous to the adult denture? Is it true that a *large percentage* of early malocclusions have been found to correct themselves during this period through natural growth?

The consultants cite a lack of evidence that orthodontic movement of the teeth in any way affects the growth of underlying bone, or that the bones proper will be in any way affected if the teeth are left in malocclusion. Is this conclusion really more significant than clinical observation to the contrary, since adequate control is lacking in either case? In other words, if early malocclusion is treated, who can say what would have been the result without treatment, or vice versa? Individual and environmental differences, and the difficulties of experimenting with human beings make a direct approach to this problem impracticable. Through the study of large numbers of children over long periods of time norms may be established which will furnish a basis for such comparison, but do they exist today?

Certainly much more evidence should be forthcoming to support the broad unqualified statement that "there is no justification for the treatment of malocclusion, of whatever form, in the deciduous dentures."

*Charles M. Waldo.*

My Dear Dr. Pollock:

A letter from Dr. William Humphrey states that Dr. Chas. Waldo challenges the answer to the question "When is the proper time for Orthodontic treatment?" as published in the *New York Journal of Dentistry* over the names of Drs. Anderson, Kemple and myself. I have a copy of his letter which is being sent to the Forum of the INTERNATIONAL JOURNAL.

This composite was made by an associate editor and published without my ever having seen it.

It is very different from my views which were submitted to the associate editor.

I agree that many cases are being treated which should not be, and that some cases will correct themselves, but I also believe that some cases *should be treated* in the deciduous dentition.

The following article is my complete answer as submitted to the assistant editor of the *New York Journal of Dentistry.*

Sincerely,

(Signed) Lowrie J. Porter.

"The age of the patient has very little significance in determining the proper time for beginning orthodontic treatment, since children of the same age may reach various stages of development. Undoubtedly, many cases are today being treated orthodontically which should have been delayed, or possibly some should never have been treated. Natural growth processes will frequently remedy many cases of apparent malocclusion, while other cases with a little orthodontic assistance will be greatly aided when nature does not seem to be reaching the stage of development believed to be normal for a particular child.

"The dentist and the orthodontist assume a deep responsibility in advising patients whether or not orthodontic treatment should be undertaken. While variations will occur in which judgment must be used, the following schedule, in my opinion, will serve as a guide.

"1. Class I. (Normal mesiodistal relation of arches.)

"A. *Narrow Arches:* Arches which are *extremely lacking* in lateral development may be slowly expanded, *while the deciduous cuspids and molars have well-developed roots.* Lateral development after these deciduous roots are partially resorbed will be of very little benefit to the developing permanent teeth. If not undertaken at this time, treatment should wait until the bicuspids erupt. This is not as advantageous, since tipping of the bicuspids will often follow with a resultant faulty occlusion.

"B. *Spaced Central Incisors:* Spaced central incisors due to abnormal labial frenums should be corrected fairly early (after the lateral incisors erupt), as this often results in a normal resorption of the frenum. The frenum should not be resected until after the teeth have been brought together and held for a considerable length of time. Few frenums need resection if corrected early. Resection of frenum before closure of central incisor spaces may result in scar tissue formation and necessitate a second resection, after

the teeth have been brought together. Many teeth, however, normally erupt with separation of central incisors in which there is no frenum involvement. These central incisors will often close when the lateral incisors erupt, and orthodontic treatment is not indicated.

"C. *Deep overbite:* Deep overbite (Class I) should not be corrected until the bicuspids erupt unless there is a gingival tissue irritation. Many cases of overbite will correct themselves when the child reaches twelve or fourteen years of age, a period of the most rapid vertical growth of the bones of the face.

"2. Class II. (Mandibular arch in distal relation to maxillary arch.)

"A. *Receding Chin:* A receding chin bone will not be affected by orthodontic intervention regardless of the age when treated. The facial profile will be greatly changed when the mandible grows forward by orthodontic assistance, but the chin itself remains the same.

"B. *Receding Mandible:* A patient having a decided lack of forward growth of the mandible (as in some 'adenoid type' cases), should be treated early, as the forward development of the mandible is most readily affected at that time (six or seven years of age). If the facial profile is not a matter of consideration, then these cases may be treated at a later date (when the bicuspids start to erupt), entailing less treatment and less expense to the patient.

"C. *Lip Habit:* If the lower lip rests under the maxillary incisors, it is often well to treat the case early to give nature a chance to develop a natural tone to the lip muscle. If not treated early the lip enlarges, the protrusion increases, the anterior segment of the maxilla becomes more deformed, and, because of the lack of lip tone, retention is much more difficult after treatment.

"D. *Deep Overbite:* (Class II.) Many cases of deep overbite will be corrected when intermaxillary elastics are worn. If the excessive overbite is irritating to the gingival tissues, early treatment may be warranted, but otherwise its correction at the time of eruption of the bicuspids will be most advantageous.

"3. Class III. (Mesial occlusion.)

"No other cases warrant early treatment (even at four or five years of age) as much as this type, in the attempt to avoid an apparent progressive facial deformity.

"4. *Open-Bite:* Open-bite cases usually involve a tongue habit which is difficult to stop. The tongue rests between the teeth in the act of swallowing and exerts a decided force, preventing a normal eruption of the anterior teeth. Treatment should be initiated when the child is still in the growing stage.

"5. *Cross-Bite:* It is well to treat in the deciduous dentition and establish normal function if a facial deformity is apparently developing.

"6. *Habits:* Most pernicious habits start in very young children (two or three years of age), and should be recognized by the dentist. Some means should be used to stop habits if possible. These do not ordinarily need orthodontic treatment at that time, but often will at a later date if preventive orthodontia is not practiced by the dentist.

"7. *Early Loss of Deciduous Teeth:* Following early extraction of deciduous teeth the remaining teeth may drift forward. This should be corrected early before the complete development of the second molars. A knowledge of the intelligent use of space maintainers and space openers is most important in order to avoid interference with the natural growth of the dentures.

"8. *Third Molars:* When a case is finished and before dismissal, radiograms should be taken to see whether there is a normal eruption of the third molars. If these teeth have a tendency toward impaction because of lack of forward growth of the mandible or maxilla, retention should be maintained until their eruption or extraction (or the case should be carefully watched for any untoward effects), as many treated cases are completely upset by eruptive pressures of the third molars.

"9. *Length of Time for Treatment:* All cases under orthodontic treatment should be under the care of the orthodontist until the permanent teeth are all in place (except the third molars). This does not mean that children will need to wear appliances from the time they are six or seven years old until they are thirteen or fourteen, or even longer. The main thing in orthodontics is to know that it is merely a question of stimulating growth, and that this should be done at the time when nature, under normal conditions, should be producing this development. No one age can be given for starting treatment, as all cases vary decidedly and require careful judgment in deciding the best time for starting treatment."

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Dr. Anderson's answer as sent to the *New York Journal of Dentistry.*
WHAT STAGE IN THE DEVELOPMENT OF DENTITION IS BEST SUITED FOR INITIATING ORTHODONTIC TREATMENT?

NOTE: I take this question to be practically the same as one commonly asked by the laity, medical, and dental professions, i.e., "What is the best time to start orthodontic treatment?" That is the way I shall answer it, but were I a student answering it as one of my examination questions I should take it to mean a general discussion of the calcification, decalcification, position prior to eruption, eruption and occlusion of the teeth. I do not think you mean that for the simple reason that it could not be answered in a brief manner. In fact, I know it cannot for I wrote two pages along that line and realized how deep I was getting and tore them up.

Now as to my answer to your question. I shall have to ask that you bear with me in regard to it for I shall quote considerably from a revision of *Practical Orthodontia* by Martin Dewey on which I have been working for nearly two years and which has just come from the Mosby Company in finished form. Chapter XII deals with "The Approach to Treatment" which includes the subject now under discussion.

"The most opportune time to begin the treatment of malocclusion varies with each individual. In years past it was not uncommon to hear the statement made that treatment should not be undertaken until the child was about

twelve years of age though treatment of the deciduous teeth was forcefully advocated by certain enthusiasts. It is difficult to understand why twelve years of age was chosen. By that age all of the permanent teeth with the exception of the third molars are erupted or at least partially so; and their positions of malocclusion as determined by the etiologic factors in preceding years are definitely established. In fact, waiting until about twelve years of age simply means, as a general rule, that the malocclusion has had an opportunity to develop to its worst. To select a specific year to advise orthodontic treatment for all children is contrary to all the laws of nature associated with the development of the teeth and jaw growth. There is a great variation in children even in twins, and a child ten years of age may be advanced as far dentally or in jaw growth as another at fourteen years. This inconsistency alone proves the inadvisability of accepting age as the determinant of time for treatment. There is no doubt that early treatment is preferable to later correction. It must not, however, be overdone. For many cases of what apparently is a fairly severe malocclusion at one age will be materially improved a few years later.

"T. Wingate Todd has shown three periods of most rapid horizontal jaw development. The first period is up to the seventh month which, of course, excludes the possibility of orthodontic treatment. The second period of most rapid jaw development is from the fourth to the seventh year, and the third is from the sixteenth to the nineteenth year. This would seem to indicate a logical basis for the claim of those who insist upon early treatment of malocclusion. It is quite evident that natural growth to its fullest extent would be a welcome asset to any orthodontic treatment; so it is reasonable to suppose that orthodontic treatment would have better results initiated during the second period of greatest horizontal growth of the jaws. Even as there are greatest periods of natural growth, so do we find periods of growth retardation which would serve to hinder orthodontic treatment. Observation then of practically all cases for a reasonable period before the initiation of treatment would seem to be a sensible procedure, and plaster casts will aid in supplying an invaluable record of changes over the observation period so that there will be no question in any one's mind as to the wisdom of suggesting the importance of corrective treatment.

"A good general rule to follow in deciding age for treatment is to base the examination of the malocclusion upon the extent of deviation from normal regardless of age. Treatment should be given therefore as soon as it is noted that a malocclusion exists which will not through the normal processes of growth, tooth eruption and alignment correct itself. A clear conception of the normal or ideal for the particular individual is highly important. Teeth are formed in anticipation of a certain growth in the jaws; and, if through environmental or other circumstances there is an interference to this growth, malocclusion of a temporary or permanent nature may result. As soon therefore as one is able to determine that the developing malocclusion is of a permanent nature, treatment should be undertaken."

*George M. Anderson.*

Dear Dr. Humphrey:

I am enclosing herewith replies to the questions asked by Dr. Waldo, which you forwarded to me January 23, which you are at liberty to use if you wish.

These replies are sent not with any desire to take part in a controversy, but with the hope that a free and frank discussion may ensue which might benefit the specialty in which we are all deeply interested.

Very truly yours,

*F. C. Kemple.*

Replies to questions by Dr. Charles M. Waldo re article in the *New York Journal of Dentistry,* captioned "Initiation of Orthodontic Treatment," January, 1936.

Question 1: Where and by whom have many children been observed for periods sufficient to cover development from the deciduous to the adult denture?

Answer: Assuming that "adult denture" means the twenty-eight permanent teeth, fully erupted, as usually found in the mouths of children from eleven to fourteen years of age, and not including the third molars, I refer Dr. Waldo to Prof. Kantorowicz, of the University, Boon, Germany; to Dr. Milo Hellman, New York City; to Dr. Hugh K. Hatfield, Boston; to Dr. Samuel J. Lewis, Detroit; to Dr. John V. Mershon, Philadelphia.

Observation over five to eight years is, as a rule, sufficient to cover the period of transition from deciduous to permanent dentures. The men whose names are mentioned above have models and records tabulating their observations for longer periods.

Question 2: Is it true that a *large percentage* of early malocclusions has been found to correct themselves during this period through natural growth?

Answer: It is most certainly true that a large number of dentures which, in their early stages of development, appeared to be in distinct malocclusion, have corrected themselves through natural growth, and without any orthodontic treatment whatever. Moreover, such improvement in the mouths of young children occurs with sufficient frequency to justify our keeping most young patients under observation for a considerable period before initiating orthodontic treatment.

Question 3: Re "lack of evidence that orthodontic movement of the teeth in any way affects the growth of underlying bones, or that the bones proper will be in any way affected if the teeth are left in malocclusion?" Is this conclusion really more significant than clinical observation to the contrary, since adequate control is lacking in either case?

Answer: Since control is completely lacking in both treated and untreated cases of malocclusion, it is impossible to predict what might or might not have happened if the treated case had not been treated, or if the untreated case had been treated. But, in more than thirty-five years of practice in orthodontia, I have failed to see any definite clinical evidence that the underlying bone is perceptibly affected by orthodontic tooth

movement. If it is affected at all—and it may be reasonable to believe that it might be—the effect must be so slight as to be practically negligible.

Question 4: Certainly much more evidence should be forthcoming to support the statement that "There is no justification for the treatment of malocclusion, of whatever form, in deciduous dentures."

Answer: With this appeal for "more evidence," I agree entirely. Probably the most imperative need in the field of orthodontia today is, that orthodontic problems should be solved by *evidence* and not by *assumption or tradition.*

In my early practice in orthodontia I believed, as did every other graduate of the Angle School at the time, that malocclusion should be treated as soon as it became manifest; "the younger the better" seemed to be the canon of the day. But after treating a few cases for children of five or six years of age, I became convinced that these patients had not been benefited by the treatment; that moving the deciduous teeth *did not* affect favorably the eruption of the permanent teeth; and that the principal effect of moving deciduous teeth was to stimulate their root absorption and their premature loss. This belief was confirmed by the experience of other orthodontists. And today there are a number of men whose years of practice and success entitle their opinions to respect, who, as one man expressed it, "never touch them."

*F. C. Kemple.*

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## Editorials

### It Is Here

A NOTABLE forward step toward meeting the problem of illness costs is the group hospitalization insurance plan announced recently by old and well-established medical societies in various parts of the United States. Under the plan, members of employee groups pay 75 cents a month to obtain up to twenty-one days of hospital care a year if needed, and this plan is rapidly becoming a reality in several cities of this country.

Since an unexpected hospital bill, for which few families make advance provision, is likely to work havoc with budgets, the plan is welcomed by many people, especially those to whom hospitalization of a member of the family becomes, in times of stress, a financial catastrophe. It is also welcomed by hos-

pitals, since it provides income for those institutions whose facilities now are rarely used to capacity.

The problem of doctors' fees, which also are often a heavy burden upon the family pocketbook, is not solved by this plan, of course. It points the way, however, toward group medical practice. The fact that the hospital plan is sponsored by the medical societies and the fact that the plan is in actual operation further illustrate that the parade may go down the street and the man on the sidewalk be so busily engaged in an argument as to whether or not there is to be a parade that he may not see it pass by.

Medical and dental service for larger groups of people is not on the way; it is now here, manifesting itself step by step, month by month, first in this locality, then in that one. Orthodontists must not be blinded to the fact that there will ultimately be an urgent demand for modern and competent orthodontic service for much wider brackets of society than have existed in the past, and they must realize that this very thing is now happening in a more or less slow motion tempo but will gain momentum from year to year.

—*H. C. P.*

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## Oral Pathology

THE establishment of a section for Oral Pathology in the Department of Oral Surgery in this JOURNAL should prove of great value to the dental profession, furthering the advancement of a most important fundamental science, the cultivation of which is essential to the development of precision in diagnosis, proficiency in prognosis, and understanding of therapeutic measures.

Pathology is a science boundless in extent. We distinguish clinical pathology, histopathology, chemical pathology, pathologic physiology, and experimental pathology. Pathology lays a foundation to our concept of disease, but it also gives the final verdict and thus serves to check the accuracy of clinical diagnosis and the efficiency of our methods of treatment.

Pathology should not be regarded as a predental or preclinical subject alone, because the greatest benefit is derived from the constant use of pathologic investigations. These investigations are not limited to microscopic study alone—valuable as this time-honored method is—they include blood chemistry, analysis of urine and saliva, roentgen examination of the teeth and bone, and animal experimentation. Thus a wide knowledge is required to keep step with new developments in our profession, and a good general foundation is a requisite to understanding the general causes and local effects of deficiency diseases, nutritional disturbances, changes in endocrine function, blood dyscrasias, and diseases of the vital organs. These influences affect the function of all the individual cells, decreasing their nutrition, lessening oxidation, and causing changes by chemical decomposition or poisoning. The odontogenic cells and the parodontal structures are especially sensitive to such influences, presenting veritably an indicator of the general health of the body, which is recognized by the fact that the oral cavity often harbors important and early signs of somatic diseases.

The Editor hopes in the course of time to publish papers which will demonstrate important relations of general diseases to diseases of the oral cavity and

tissues of the teeth. He also will endeavor to present case reports which will illustrate the value of history-taking, and painstaking examination by available laboratory procedures.

*Kurt H. Thoma.*

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**The Hartman Formula**

THE dental profession throughout America was struck with bewilderment when recently from headlines, newsboys, radios, and even the new form of radio drama, the discovery of a dentin desensitizer was broadcast from coast to coast and from the Hudson Bay to the Panama Canal. This was interesting to the dental profession because its members knew so little about it, and interesting to the layman because every one else seemed to know so much about it.

Subsequent to the blaze of publicity, however, emanating from the discovery by Dr. L. L. Hartman of Columbia University School of Dentistry, Dr. Hartman presented a paper before the First and Second District Dental Societies of the state of New York on "A New and Effective Means of Dentin Desensitization" and at that time disclosed to the profession the results of twenty years of research and made the preparation available to the entire dental profession, to be used according to directions.

Dr. Hartman is to be commended for his contribution to science, and it is hoped that the product will live up to the great expectations which have been built up in the public mind, because now the laymen will expect excellent results to be delivered by the dental profession.

Unless it is unlike many other new drugs which are introduced from time to time, much will depend upon the technic of application by the individual operator and on the character and type of cases selected for experiment.

Many official and nonofficial surveys are being made on the merits of this drug from the contentions made by Dr. Hartman. When the results of these surveys come in and are tabulated and checked, then, and only then, may the public know whether or not it may secure from the dental profession the relief from annoying pain that it has been led to expect in the future. Time will tell.

On account of the apparent diversity of opinion in regard to the merits of the Hartman Desensitizer in practice, the St. Louis Dental Society is now conducting a survey throughout its entire membership. Each member has been sent a copy of the accompanying chart [see following page] and is expected to make his report to the society in the shortest possible time that he is able to compile it. This report will no doubt be of great interest to the dental profession at large.

*—H. C. P.*

## Clinical Report on Hartman's Desensitizer

St. Louis Dental Society

Dr. ----------

| Case No. | Name or Initial | Type of Patient: Sex | Age | Normal Nervous Phlegmatic | Tooth | Type of Cavity | Technic: Was Dam Applied? | Was Cavity Dried Before Application? | Was Cavity Dried After Application? | Desensitization: Complete | Duration | Partial | Negative | Number of Applications | Where was Solution Purchased? | Remarks |
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Operator should determine sensitivity before application of desensitizer.

# In Memoriam

### Louis P. Bethel

Dr. Louis P. Bethel, another one of the pioneer orthodontists in the United States, who practiced for many years in Columbus, Ohio, has passed away. He died of heart disease at the age of seventy-five years.

At the time of his death January 17, 1936, Dr. Bethel was the senior past president of the Ohio State Dental Society. He was very highly regarded in orthodontic and dental circles and gave to humanity a lifetime of diligent service. Dr. Bethel had been retired from practice for the last five years of his life. He was succeeded in his practice several years ago by his former associate, Dr. Earl C. Jones, who is president elect of the Ohio State Dental Society.

Born in Kent, Ohio, Louis P. Bethel attended Kent public schools and was graduated from the University of Michigan dental school in 1885. After his graduation he joined the editorial staff of the *Ohio Dental Journal* in Toledo, later becoming its editor and continuing in this position, when the periodical became the *Dental Summary,* until 1926.

He occupied teaching posts in Northwestern Ohio Medical College, Toledo; Cleveland Dental College, and Western Reserve University Dental School. Dr. Bethel went to Columbus in 1902 as dean of the Dental College, Ohio Medical University, now a part of Ohio State University. In 1906 he withdrew from college work to specialize in orthodontia and editorial work.

He was appointed a member of the Ohio State Board of Dental Examiners in 1898. He served as president of the Ohio State Dental Society in 1898 and later as president of the Northern Ohio Dental Association, president of the Columbus Dental Society, vice-president of the Fourth International Dental Congress at St. Louis in 1904, and was elected vice-president of the National Dental Association in 1905.

He was a fellow of the American College of Dentists and of the International College of Dentists. He was one of two life members of the American Association of Dental Teachers.

Dr. Bethel was a member of Delta Sigma Delta dental fraternity and of Omicron Kappa Upsilon, honor dental fraternity.

Surviving him are his wife, Mrs. Hattie Morse Bethel; a daughter, Mrs. Ralph H. Buck, Evanston, Ill.; and a brother, Harry J. Bethel, Donna, Texas.

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## "IN MEMORIAM" RESOLUTIONS OF THE SOUTHERN SOCIETY OF ORTHODONTISTS

### Albert H. Ketcham

The annals of orthodontia record no sadder event, nor one fraught with greater loss to the profession, than the death of Dr. Albert H. Ketcham. He was an honorary member of the Southern Society, and in his election the Society

honored itself quite as fully as it did Dr. Ketcham. His memory will always evoke the highest regard and esteem of every member.

His was an interesting career. Compelled by ill health to move from his native environment, he adapted himself physically, intellectually, and fraternally to a new one, and in the face of more than one serious physical handicap, built a career equaled by very few in the profession. His death, from pneumonia, occurred only two or three months after a successful operation for cataract, which would have enabled him to continue his practice with the same intense interest and vigor that had always characterized his pursuit of it, as well as the wide collateral activities of his life.

One of the marked attributes of Dr. Ketcham's life, was the whole-hearted manner in which he gave of himself to the profession and to his friends. His capacity for sympathy in the problems and disappointments of fellow practitioners has always been an inspiration to the young men who came in contact with him, and meant much in their professional development.

The obituaries of Dr. Ketcham recount elsewhere his splendid attainments in professional and community life. In this tribute to his memory, the Southern Society desires to record its high appreciation of those attainments (which were international in their scope), his fine personal character, and also, its deep sense of loss at his passing. Be it therefore

*Resolved,* That a page in our minute book be set aside for this purpose and copies be sent to the members of his family (who, with us, mourn his departure) and to the orthodontic and dental journals.

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**John Lewis Walker**

The Southern Society of Orthodontists again experiences the great loss, which any organization sustains, in the death of one of its most respected and beloved members, Dr. John Lewis Walker, of Norfolk, Virginia.

Obituary notices published in prominent journals of the Society recount faithfully and at length the most important events in Dr. Walker's early life and in his later professional life. The Southern Society desires in these resolutions to express the profound sense of loss it has suffered in the passing of one of its members and at the same time its admiration for those qualities which both in his early life, later on as a general practitioner, and finally during the many years which he devoted to orthodontia as a specialty, made him one of the most respected and outstanding men in his community and indeed in the entire South. He left no obligation in life unfulfilled, and the Society is richer for his association with it as a member. Be it therefore

*Resolved,* That a page in our minute book be set aside to record this tribute by the Southern Society to the high character and accomplishments of Dr. Walker, and that copies of it be sent to the members of his family (who, with us, mourn his departure) and to the orthodontic and dental journals.

*Oren A. Oliver*
*Claude R. Wood*
*Harry E. Kelsey, Chairman*

# News and Notes

## Preliminary Program of American Society of Orthodontists St. Louis, April 20, 21, 22 and 23

HOTEL HEADQUARTERS—JEFFERSON HOTEL

MONDAY, APRIL 20, 1936

*Morning Session*

8:00 A.M.-9:00 A.M. Registration.
10:00 A.M. Executive Committee—Jefferson Hotel.

*Afternoon Session*

The golf tournament will be held at Sunset Hill Country Club. The golf course of this club is one of the most picturesque in the country and is sporty enough to be interesting to all golfers.

Prizes have been arranged for all classes participating in the event, and in the evening a stag dinner will be held at the Club. Transportation will be provided from the Jefferson Hotel to the golf club in the morning and afternoon. Members who are interested may play a round of golf in the morning.

*Evening Session*

7:00 P.M. Golf dinner—Sunset Hill Country Club. Award of golf prizes and fellowship dinner.

TUESDAY, APRIL 21, 1936

*Morning Session*

Registration.
9:00 A.M. Executive session. Report of Board of Censors. Report of Secretary-Treasurer. Report of Program Committee. Announcements. Address of Welcome. By Virgil Loeb, St. Louis, Mo.
10:00 A.M. President's Address. By H. C. Pollock, St. Louis, Mo.
10:30 A.M. The Diagnosis and Treatment of Dental and Mandibular Retroversions. By James D. McCoy, Los Angeles, Calif.
11:30 A.M. Case report: Distoclusion Case—Success or Failure? Why? By George R. Moore, Ann Arbor, Mich.

*Afternoon Session*

2:00 P.M. Paper: Orthodontics in the Field of Maxillofacial Surgery. By Lieut-Col. Leigh C. Fairbank, Washington, D. C.
3:00 P.M. Paper: Symptoms Associated With Disturbed Function of the Mandibular Joint. Study of One Hundred Cases. By James B. Costen, St. Louis, Mo.
4:00 P.M. Case report: Two Cases of Retarded Dentition With Diagnosis Complicated by Supernumerary Teeth and Undetermined Systemic Factors. By H. F. Hoffman, Denver, Colo., and Charles Waldo, New York, N. Y.
4:20 P.M. Case report: Arrested Root Resorption During Orthodontic Treatment. By J. Lyndon Carman, Denver, Colo.
4:40 P.M. Case report: Manifest Evidence of the Cause of Relapse in Many Treated Cases of Malocclusion. By George W. Grieve, Toronto, Ontario.

*Evening Session*

7:30-11:00 P.M. General Clinics (special rooms—second floor).

*Chrome Alloys*

1. Electric Spot Welding of Chrome Alloy. By Leonard T. Walsh, Pueblo, Colo.
2. Soldering Chrome Alloy. By T. W. Sorrels, Oklahoma City, Okla.
3. Chrome Alloy Orthodontic Appliances. By J. M. Jones and J. Victor Benton, Wichita, Kan.
4. Chrome Appliances Used in My Practice. By Brooks Bell, Dallas, Tex.

*Type of Appliances*

5. A Simple, Efficient, and Inexpensive Appliance. By Clifford G. Glaser, Buffalo, N. Y.
6. Stationary Lingual Loop Appliance, Technic of Construction and Treatment. By Chilton E. Byington, Chattanooga, Tenn.
7. Appliances for Treating Overbite Cases of Malocclusion. By Howard D. Keeler, Des Moines, Ia.
8. The Use of an 0.015 × 0.0218 Steel Arch Wire in Starting a Case to Be Treated With the Edgewise Mechanism. By Ralph P. Howarth, Cleveland, Ohio.
9. The Application of the Incline Plane in Conjunction With Intermaxillary Elastics in the Treatment of Distoclusion Cases With Overbite. By Willard A. Gray, Rochester, N. Y.
10. A. The New Snap-Lock Labial and Lingual Attachments.
    B. An Instrument for Determining and Equalizing the Forces to Be Applied to Teeth in Orthodontic Treatment. By Landis H. Wirt, South Bend, Ind.
11. Coiled Spring to Open Spaces, Adjunct to Russel Lock. By Richard Lowy, Newark, N. J.
12. Uses of the Modified Wire Coil Appliances. By W. B. Stevenson, Amarillo, Tex.
13. Motion Pictures of the Construction of Labial and Lingual Arches. By Van A. Stilley, Jr., Paducah, Ky.
14. Various Applications of the Bite Plane Principle for Correcting Mesioclusion and Distoclusion Cases. By C. W. Bruner, Waterloo, Iowa.

*Molar Bands*

15. A Simple Method of Making Molar Bands That Fit. By Allen E. Scott, San Francisco, Calif.
16. The Six Parts in the Making of Reinforced Anchor Bands for Molar Teeth. By Jesse F. Keeney, Quincy, Ill.
17. Anchor Bands by Indirect Technic. (Twenty Years' Refinement.) By L. M. Waugh, H. U. Barber, Jr., and G. S. Callaway, New York, N. Y.

*Treatment*

18. The Treatment of Maxillary Incisors in Mixed Denture Cases to Prevent Cuspids From Erupting Labially to the Lateral Incisors. By Harry L. Morehouse, Spokane, Wash.
19. Early Facial Corrections. By Kirman E. Taylor, Denver, Colo.
20. Treatment of Impacted Central Incisors. By Burton A. Hoffman, Buffalo, N. Y.
21. Interesting and Positive Method of "Erupting" an Imbedded Cuspid Without Mutilating or Making Any Attachment to the Cuspid Tooth. By Archie C. Gifford, Oshkosh, Wis.
22. The Practical Application of Milo Hellman's Research on the Growth of the Face and the Development of the Dentition, Showing Treated Cases With the Appliances Used. By M. A. Munblatt, New York, N. Y.

23. Examples of Compromise Treatment. By S. Stuart Crouch, Toronto, Canada.
24. Models Showing Some Results Obtained by Early Treatment. A New Material Which Provides a New Method for Treating Children With Cleft Palate. By Harry W. Perkins, Boston, Mass.
25. Cases Under Treatment. By A. B. Thompson, Des Moines, Ia.
26. A. A Case of Maxillary Fracture Involving Bones of Orbit, Satisfactorily Treated by Orthodontic Interference.
    B. Bringing Unerupted Cuspid Teeth Into Plane of Occlusion by Spring Force, With Auxiliary Core Attached. By Irving Spenadel, New York, N. Y.

*Retention*

27. Functional Retention (Zipper Type) in Supraclusion Cross-Bite and Open-Bite Cases. By Thomas M. Robertson, Coffeyville, Kan.
28. A. All Wire Retainer.
    B. Removed Latch Wire Idea.
    C. Chin Retractor. Class III Cases. By W. E. Stoft, Omaha, Neb.
29. Some More Removable Bite Planes, Guide Planes and Retainers. By Andrew F. Jackson, Philadelphia, Pa.

*Results of Treatment*

30. Bite Planes. By Hugh G. Tanzey, Kansas City, Mo.
31. Some Results From Early Treatment in Cases With Crowded Mandibular Incisor Teeth. By A. A. Somerville, Toronto, Canada.
32. A. Tongue Habits—Two Severe Cases With End-Results.
    B. Possibilities in Treatment of Missing Maxillary Lateral Incisors. By Harold E. Sippel, Buffalo, N. Y.
33. Open-Bite in Identical Twins. By G. Hewett Williams, Chicago, Ill.

*Interesting Cases*

34. A Few Unusual Orthodontic Cases (Fracture Case; Cleft Palate Cases, etc.). By Frank S. Cartwright, Detroit, Mich.
35. Orthodontia and Prosthodontia. (Photographic portrayal of results obtained through their coordination.) By Harry H. Sorrels, Oklahoma City, Okla.
36. A Little Experience With Cleft Palate Cases. By W. E. Lundy, Memphis, Tenn.

*Aids in Treatment*

37. A Practical Head Positioner as Used in a New Technic for Temporomandibular Joint Radiographs. By L. B. Higley, Iowa City, Iowa.
38. A Simple Method Found Useful in Determining Possible Tooth Positions in Mutilated Cases and Adult Cases. By Frank Nash, Scranton, Pa.
39. Record Keeping of Shedding of Deciduous Teeth and Eruption of Permanent Teeth. By Asa J. LaGrow, Oak Park, Ill.
40. A Demonstration of Root Absorptions Caused by Erupting Cuspids, Accompanied by X-ray Pictures and Models Showing the Results of Treatment. By Howard J. Buchner, Oak Park, Ill.
41. Silver Nitrate as a Protection Against Caries Beneath Anchor Bands. By Frederic T. Murlless, Jr., Hartford, Conn.
42. Metal Casts for Making Appliances. By Paul R. Nolting, Springfield, Mo.

*Photography*

43. Clinical Photography of Orthodontic Cases. By Howard E. Strange, Chicago, Ill.
44. Miniature Photography. By A. C. Broussard, New Orleans, La.

*Miscellaneous*

45. Practical, Time-Saving Orthodontic Instruments. By Earl W. Swinehart, Baltimore, Md.
46. Modelling Compound Impressions With Improved Heater. By Walter J. Furie, Long Beach, Calif.
47. Diagnostic Chart Protecting the Orthodontist. By Homer B. Robison, Hutchinson, Kan.

WEDNESDAY, APRIL 22, 1936

*Morning Session*

9:00 A.M. Paper: Class III Malocclusion of the Teeth as a Part of the General Problem of Orthodontia. By Milo Hellman, New York, N. Y.

10:00 A.M. Paper: Studies in Palatograph. By Miss Nena Kate Ramsey, Texas.

11:00 A.M. Case report: Case of Hemiacromegaly—Showing Eruption of Maxillary Right Permanent Cuspid and Mandibular Right First Bicuspid at Four and One-Half Years of Age. By E. B. Arnold, Houston, Tex.

11:30 A.M. Case report: Class I Malocclusion, With Pronounced Anterior Open-Bite, in the Mouth of a Monkey, Induced by Constant Finger-Sucking. By Harry E. Kelsey, Baltimore, Md.

12:00 NOON. Past presidents' luncheon. Jefferson Hotel.

*Afternoon Session*

1:30 P.M. Paper: Efficient Practice Management as a Means of Increasing Quality and Extending the Availability of Orthodontic Service. By Floyd E. Gibbin, Buffalo, N. Y.

2:30 P.M. Paper: General Growth States as Correlated With the Ossification of the Bone Centers of the Hand. By Clinton C. Howard, Atlanta, Ga.

3:15 P.M. Case report: The Treatment of a Unilateral Distoclusion Case With an Extreme Overbite. By Richard A. Smith, Evanston, Ill.

3:30 P.M. Case report. Problems which were not given consideration in the beginning of treatment but which became increasingly important during treatment and since its conclusion. (Three cases will be illustrated, at least fifteen lantern slides.) By George M. Anderson, Baltimore, Md.

3:45 P.M. Case report: The Treatment of Two Open-Bite Cases. (Motion pictures of each case showing abnormal muscular function.) By Howard E. Strange, Chicago, Ill.

4:00 P.M. Executive session. Report of President's Address. Report of committees. Election of officers.

*Evening Session*

7:00 P.M. Dinner dance and entertainment (informal) in the Club Continental, Hotel Jefferson.

THURSDAY, APRIL 23, 1936.

*Morning Session*

9:00 A.M. Paper: Etiology, Diagnosis and Treatment of Class II, Division 1. By Gerald Franklin, Montreal, Quebec.

10:00 A.M. Paper: An Orthodontic Diagnosis Based Upon Osseous Structure. By F. Vernon Fisk, Toronto, Ontario.

10:15 A.M. Case report: A Distoclusion Case. By Hugh T. Berkey, Fort Wayne, Ind.

11:00 A.M. Case report: Cooperation. By Harvey G. Bean, Toronto, Ontario.

11:30 A.M. Case report: Report of a Multilated Case in Which Early Orthodontic Interference Prevented an Otherwise Hopeless Deformity. By Hugh Grun Tanzey, Kansas City, Mo.

12:00 NOON. Luncheon.

*Afternoon Session*

1:30 P.M. Lecture clinics (special rooms—second floor). These six lecture clinics will be presented simultaneously and each will be presented three times. Each lecture will last forty minutes with a ten-minute intermission. Hence the following schedule:

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|---|---|
| First lecture | 1:30 to 2:10 P.M. |
| Second lecture | 2:20 to 3:00 P.M. |
| Third lecture | 3:10 to 3:50 P.M. |

Admission to clinic rooms by ticket only.

1. Presenting a Standardized Technic of Fabricating Chrome Alloy by Spot Welding. By Archie B. Brusse and J. Lyndon Carman, Denver, Colo.
2. Analysis of Malocclusion. By George W. Grieve, Toronto, Canada.
3. The Treatment of Open-Bite Cases. By William R. Humphrey, Denver. Colo.
4. Construction of Appliances. By Ernest N. Bach, Toledo, Ohio.
5. Informal Discussion of Myofunctional Treatment. By Alfred Paul Rogers, Boston, Mass.
6. Ectopic Eruption of Teeth; Its Effect and Control. By Samuel J. Lewis, Detroit, Mich., and R. C. Willett, Peoria, Ill.

4:00 P.M. Business session. Reports. Installation of officers.

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All members of the American Society of Orthodontists will shortly receive the following questionnaire through the mail. This should be returned to the Chairman of the General Arrangements Committee by April 5.

## Questionnaire for St. Louis Meeting, April, 1936

All reservations and tickets will be allocated in the order of their receipt, and all questionnaires must be in by April 5.

Please check X before each item which you wish to attend and for which you want reservations. Reservations will then be made for you and tickets will be given to you at the A. S. of O. registration desk on arrival.

1. Name_____ Address_____
2. I will arrive Sunday_____ Monday_____ Tuesday_____
   I will have the following guests:
   _____
   _____
   _____
3. Please make reservations at the Jefferson Hotel for me as follows:
   Single room.
   Double room.
   Double room with twin beds.
   If you wish to make your reservations direct.

MONDAY, APRIL 20

4. I will attend the golf outing, and I have filled out the separate Golf Questionnaire.

TUESDAY, APRIL 21

5. 1. There will be a twelve o'clock luncheon for the ladies immediately followed by a tour of Jefferson Memorial, where the Lindbergh trophies are on display.
   2. Wives of members are to be guests of the Society.
   3. All other ladies are cordially invited.

6. Evening—7:30 P.M.
   1. A theater party for the ladies.
   2. Wives of members are to be guests of the Society.
   3. All other ladies are cordially invited to attend.
   4. Please reserve one guest ticket for Mrs._____
      wife of member

WEDNESDAY, APRIL 22

7. 1. 10:00 A.M.—Tour for ladies to visit Art Museum and have luncheon there, then visit Shaw's Garden.
   2. Wives of members to be guests of the Society.
   3. All other ladies are codially invited.
8. Banquet at 7:00 P.M.—This will be different from any ever given at an A. S. of O. meeting. Please see your program for details.
9. I will attend the luncheon of Past-Presidents of A. S. of O. at 12 noon. (For Past-Presidents only.)

THURSDAY, APRIL 23

10. Lecture clinics.—See program for detailed information. Each member will be able to see 4 clinics. Please number the clinics you wish to see in order of your preference.

Assignments will be made in order of the receipt of questionnaires; so please let us know your wishes by returning your questionnaire as soon as possible.

No. 1. Dr. Archie B. Brusse and Dr. J. Lyndon Carman.
No. 2. Dr. George W. Grieve.
No. 3. Dr. Wm. R. Humphrey.
No. 4. Dr. Ernest N. Bach.
No. 5. Dr. Alfred P. Rogers.
No. 6. Dr. Samuel Lewis and Dr. R. C. Willett.

11. Note here any other arrangements the committee may make for you.

Please check and return at once to the General Arrangements Committee:

DR. GEORGE H. HERBERT, Chairman.
DR. A. C. MOGLER.
DR. E. C. GOLDEN.

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## American Board of Orthodontia

A meeting of the American Board of Orthodontia will be held at the Jefferson Hotel, St. Louis, on April 17 and 18. Those orthodontists who desire to qualify for a certificate from the Board should secure the necessary application from the secretary. The application must be returned to the secretary, together with any other required credentials, at least sixty days prior to the date of examination. Applications filed at the time of the board meeting will have preliminary consideration, so that the applicant may be advised of the work required for his subsequent examination. Attention is called to the following resolutions adopted by the Board:

Any person desiring to make application to the Board for a certificate shall have been in the exclusive practice of orthodontia for a period of not less than five years or an equivalent to be determined by the board and based upon the following conditions:

1. He must be an instructor in orthodontia in a school satisfactory to the Board.

2. He must be an associate in the office of an orthodontist whose standing is satisfactory to the Board.

3. It is definitely to be understood that any person at the time of making application for a certificate shall be in the exclusive practice of orthodontia in his own name.

OREN A. OLIVER, President.
CHARLES R. BAKER, Secretary,
636 Church Street,
Evanston, Ill.

## The Edward H. Angle Society of Orthodontia

The Edward H. Angle Society of Orthodontia will hold its meeting at Hotel Del Monte, Monterey, Calif., April 5 to 11, inclusive.

GEORGE W. HAHN
Channing Way at Telegraph Ave.
Berkeley, Calif.

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## North Carolina Dental Society

The sixty-second annual meeting of the North Carolina Dental Society will be held May 11, 12, 13, in the Carolina Hotel at Pinehurst, N. C.

All members of the American Dental Association are cordially invited.

FRANK O. ALFORD, Secretary
405 First National Bank Bldg.
Charlotte, N. C.

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## Tennessee State Dental Association

The next meeting of the Tennessee State Dental Association will be held in Memphis, May 11, 12, and 13, 1936, at the Peabody Hotel.

J. FRANK BIGGER, President,
Medical Arts Building,
Memphis, Tenn.

E. J. JUSTIS, Sec'y-Treas.,
Exchange Building,
Memphis, Tenn.

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## Dental Society of State of New York

The sixty-eighth annual meeting of the Dental Society of the state of New York will be held May 12-15, 1936, at the Waldorf-Astoria Hotel in New York City.

A cordial invitation is extended to all ethical dentists to attend the sessions.

Further information may be obtained by writing to:

DR. CHARLES M. MCNEELY, President
1 Nevins Street
Brooklyn, N. Y.

DR. A. P. BURKHART, Chairman Program Committee
57 E. Genessee St.
Auburn, N. Y.

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## Ontario Dental Association

The annual convention of the Ontario Dental Association will be held at the Royal York Hotel, Toronto, Ontario, May 18, 19, 20. Dentists from the United States and from parts of Canada outside of Ontario will be welcomed as guests.

## British Empire Dental Meeting

The British Empire Dental Meeting will be held in London during the last week of July. A large delegation of Canadian dentists will be in attendance and will leave Montreal on July 10. Dr. Fred J. Conboy of 86 Bloor St. W., Toronto, Ontario, is chairman of the Arrangements Committee.

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## Postgraduate Course in Periodontia at New York University College of Dentistry

The New York University College of Dentistry will hold its third annual postgraduate course in periodontia for two weeks, full day; or for four weeks, mornings only, beginning July 6, 1936. Courses are limited to fifteen men.

The course will include etiology, diagnosis, and treatment of periodontal disease. Various technics of pocket eradication will be considered and conservative treatment stressed. Vincent's infection; diagnosis of types of bone resorption; mouth manifestations of systemic disease; periodontal foci of infection; toothbrushing; instrumentation; balancing of occlusion. Taught by lectures and clinical work, each student treating several cases.

Instruction by Drs. Samuel Charles Miller, Sidney Sorrin, J. Lewis Blass, and the entire periodontia faculty.

For information and application, address Periodontia Department, New York University College of Dentistry, 209 East 23rd Street, New York, N. Y.

SAMUEL CHARLES MILLER,
Associate Professor of Periodontia.

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## Alumni Association of New York University College of Dentistry

The last annual meeting of the Dental Alumni Association of New York University was held Nov. 26, 1935. Dr. Karl Hugo Metz, president of the Association, read his President's Address. After the regular business meeting, the scientific session was devoted to a discussion of "Dentistry in England Under National Health Insurance" by Lincoln Sterne of Manchester, England. Formal discussions followed by John T. Hanks, member of President Roosevelt's Committee on Social Security; Allen T. Newman, dean of the New York University College of Dentistry; and Leo Winter, professor of the Oral Surgery Department.

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## Ninth International Dental Congress of the F. D. I. in Vienna

In Vienna, Austria, from August 2-8 inclusive, the Ninth International Dental Congress of the Federation Dentaire Internationale will be held.

The following is a preliminary list of the subjects and speakers for the Congress.

*Section 1:* Anatomy, Histology, Physiology, Pathology.
Speakers: Hermann Euler, Breslau; Olof Norberg, Stockholm; Silvio Palazzi, Milan; Isaac Schour, Chicago.

*Section 2:* Full Denture Prothesis.
Speakers: E. W. Fish, London; C. J. Stansberg, Seattle; Georges Villain, Paris; Paul Wustrow, Berlin.

*Section 3:* History of Dentistry, Documentation, Professional Press.
Speakers: Luigi Casotti, Turin; Emil Huet, Brussels; Hedvig Stromgren, Copenhagen; Henrik Salomon, Budapest; B. W. Weinberger, New York City.

*Section 4:* Cause and Treatment of Dental Caries, Fillings.
Speakers: Russel F. Bunting, Ann Arbor; Otto Rubner, Breslau; George G. Paffenberger, Washington; Hermann Schroder, Berlin.

*Section 5:* Crowns, Fixed Bridge Work, Ceramics (Porcelain).
Speakers: Erwin Reichenbach, Munich; Stanley D. Tylman, Chicago; W. D. Vehe, Minneapolis; Jan Visser, Amsterdam.

*Section 6:* Education.
Speakers: A. Cieszynski, Lemberg; J. van der Ghinst, Brussels; Imm. Ottesen, Oslo; Amedeo Perna, Rome; Karl Pieper, Munich; T. Shmamine, Tokio; L. Solas, Paris; Jozsef Szabo, Budapest; Charles R. Turner, Philadelphia; Hermann Wolf, Vienna.

*Section 7:* Anesthetics, Narcosis, Radiology.
Speakers: F. P. Decaux, London; Wilhelm Meyer, Königsberg; Cestmir Parma, Prague; Simon Béla, Budapest.

*Section 8:* Periodontal Diseases.
Speakers: D. A. Entin, Leningrad; Carl Häupl, Prague; Maurice Roy, Paris; Oskar Weski, Berlin.

*Section 9:* Public Health Service.
Speakers: Erna Greiner, Vienna; Trygve Cythfeld, Oslo; T. Okumura, Tokio; E. Schrickel, Berlin; Jules Thébaud, Porte au Prince; Henri Villain and Renand Dannin, Paris; Fernand Watry, Brussels; Bruske and Witthaus, Holland.
Afternoon: Social Legislation.
Speakers: L. Hoffmann, Berlin; E. Stuck, Berlin; Georg Weinländer, Vienna.

*Section 10:* Root Canal Treatment, Focal Infections.
Speakers: Edgar C. Coolidge, Chicago; A. Grumbach, Zurich; Erik Hellner, Stockholm; Oskar Muller, Basle; H. H. Rebel, Göttingen.

*Section 11:* Partial Removable Denture.
Speakers: A. Elbrecht, Neu-Isenburg; F. C. Elliot, Houston; H. Housset, Paris; Max Spreng, Basle.

*Section 12:* Metallurgy.
Speakers: Ch. Bennejeant, Clermont-Ferrand; F. Hauptmeyer, Essen; Wilmer Souder, Washington; Eugen Wannenmacher, Berlin.

*Section 13:* Oral Surgery.
Speakers: G. Axhausen, Berlin; Robert H. Ivy, Philadelphia; Harold Round, Birmingham.

*Section 14:* Orthodontics.
Speakers: Milo Hellman, New York; Gustav Korkhaus, Bonn; Ch. F. L. Nord, The Hague; Edmondo Muzj, Rome; James Quintero, Lyon.

*Section 15:* Physics, Chemistry.
Speakers: Kieffer, Strasbourg; E. Nivard, Paris; Hermann Becks, San Francisco.

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## French Society of Dentofacial Orthopedics

The annual meeting of the French Society of Dentofacial Orthopedics will be held in Brussels on May 21, with Dr. L. de Coster presiding. All who are interested in dentofacial orthopedics are cordially invited to contribute to the program and to attend the meeting.

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## American Association of Women Dentists

The American Association of Women Dentists will meet at San Francisco, July 13 to 17.

Dr. Virginia Trembly,
317 Burns Building,
Colorado Springs, Colo.

## National Society for the Promotion of Biological and Physiological Psychiatry

The National Society for the Promotion of Biological and Physiological Psychiatry has recently been organized:

a) For the purpose of meeting, discussing, investigating, experimenting and fostering experimentation in biologic, physiologic, and psychologic subjects.

b) For the purpose of studying and discovering more fundamental principles relating to psychiatry.

c) For the purpose of awakening a more profound interest in the problems arising from psychiatry.

d) For the purpose of stimulating among its members an interest in the coordination of the medical sciences and the social sciences in order to bring a better understanding of psychiatry.

e) For the purpose of bringing about the coordination and cooperation of all the agencies directly or indirectly bearing upon the questions of psychiatry.

Some sections of the Society are already fully organized. This is one of the first attempts to bring together scholars who are interested in psychologic, biologic, and physiologic aspects of personality. It is a cooperative attempt to see man as a whole and to understand his problems in the light of the combined sciences.

The Section on Dentistry extends a cordial invitation to dentists interested in the psychologic and psychiatric aspects of the profession to take an active part in the forth coming meeting and to communicate with the office for further information.

ALFRED J. ASGIS, Chairman of Section on Dentistry,
422 West 115th Street,
New York, N. Y.

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## Philadelphia Orthodontists

During the last year a symposium on "The Human Face" was offered by the Philadelphia County Dental Society in conjunction with the Philadelphia County Medical Society. These lectures represent the thought of men who are oustanding in their respective fields of study and have been published in book form with illustrations. Some of the contributors are Gregory, Schaeffer, Hellman, McKenzie, Goldziehr, Lodholz, Draper, and Mershon.

This material is very unusual and will make a valuable reference book for the orthodontist. The Philadelphia Orthodontists have underwritten the cost of a limited edition of this book and will be glad to supply these books at cost as long as the edition lasts. For further information writer to Dr. Charles H. Patton, 235 South Fifteenth Street, Philadelphia, Pa.

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## Note of Interest

Dr. Virginia Trembly announces the removal of her office to 317 Burns Bldg., Colorado Springs, Colo. Practice limited to orthodontia.

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